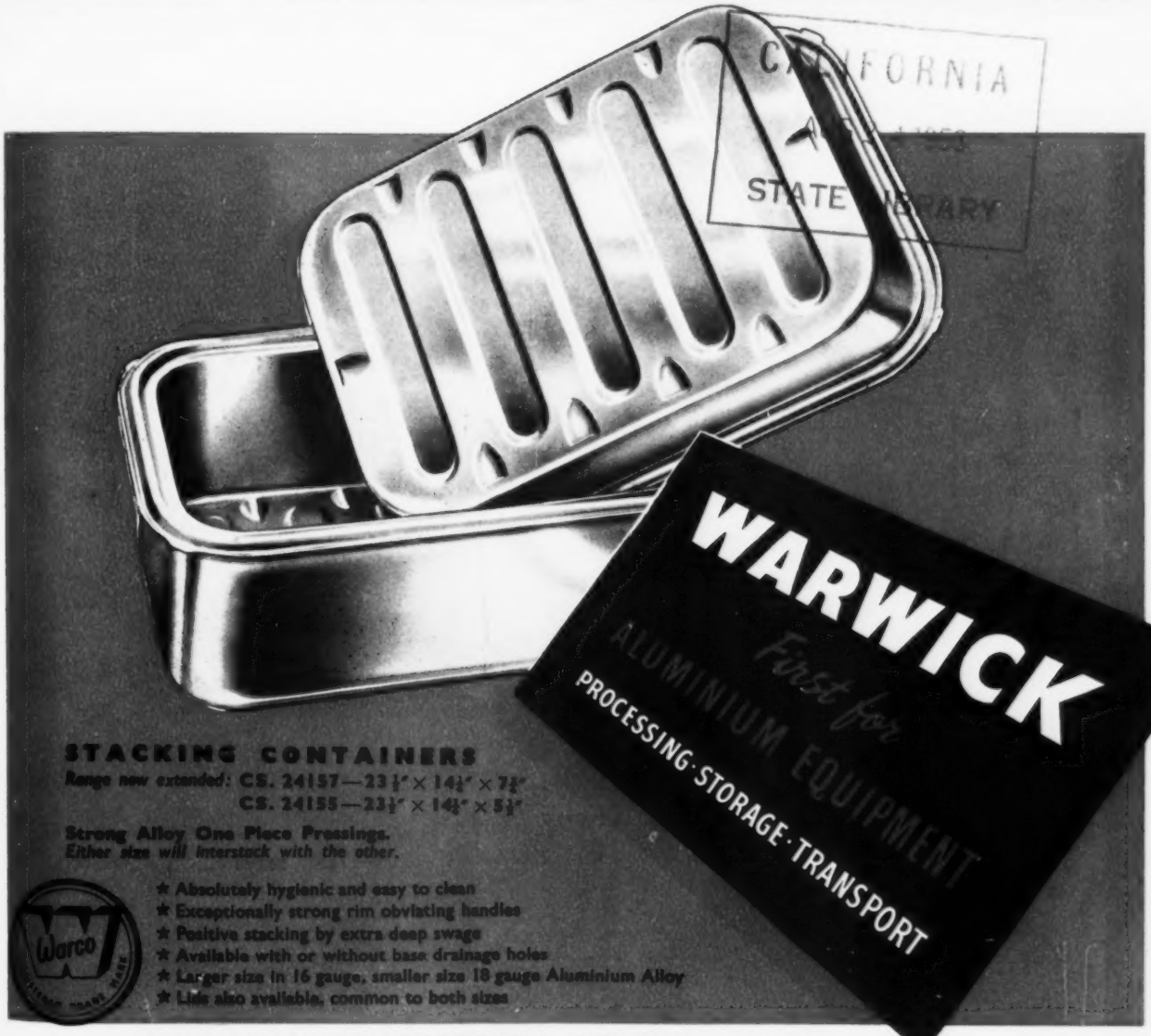
FOOD MANUFACTURE

Incorporating Food Industries Weekly

NARD HILL LIMITED, STRATFORD HOUSE, 9 EDEN STREET, LONDON, N.W.1 AUGUST 1, 1953



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CONTENTS

	Page		Page
Editorial	295	**Education in Nutrition**	319
A Modern Margarine Factory	299	**A Gluten-free Diet**	321
Antioxidants in Foods	305	**The History of the Fishmongers' Company.** *Arthur E. May*	322
Brine Freezing of Fish	308	**Australia's Canned Fish Industry.** *Peter Knox*	324
Chewing Gum	309	**Trade News**	326
Pressure Cooking and Cooling. Part II. *L. C. Davis*	310	**Information and Advice**	334
The Food and Agriculture Groups in Belgium. *W. Leonard Hill*	313	**Recent Patents and Patent Specifications**	335
Correspondence	317	**Trade Marks and New Companies**	336

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FOOD MANUFACTURE

Vol. XXVIII, No. 8 August 1, 1953

The Colonial Development Corporation

THE annual report for 1952 of the Colonial Development Corporation is once again an interesting, albeit a somewhat depressing document. The previous year's report, the first issued under Lord Reith's chairmanship, contained a lengthy record of abandoned projects and heavy losses, but it was optimistic to the extent that it foreshadowed that 1951 should constitute the peak of loss in the Corporation's operations.

Commenting on this forecast, the present report offers the observation "Events have taught us better!" No one would indeed gainsay that recent events convey a number of valuable lessons provided those who read are also willing to mark, learn, and inwardly digest.

Trading losses of the Corporation in 1952 were £638,747 compared with £643,404 in 1951, while the consolidated operating loss was £1,097,091 against £1,070,043 in 1951. The cumulative consolidated deficiency of the Corporation now amounts to £8,399,807, comparatively small compared with the colossal extravagances of the Corporation's sister, the Overseas Food Corporation, which poured £35 million of British taxpayer's money down the East African drain in the space of three years.

Last year, nine of the projects originated under the earlier administration of the Corporation were reported to have been abandoned this year. They have been followed by a further eight projects, bringing the total number of enterprises abandoned to 17. Nine new projects were started during the year so that the total number in existence is now 57.

Science and the Food Manufacturer

THE attitude of industry to science was the subject of the Presidential Address by Sir Frank Engledow, C.M.G., M.A., F.R.S., on the occasion of the Seventh Annual General Meeting of the British Food Manufacturing Industries Research Association.

Taking their own research association as an example, Sir Frank said that research might, according to subscription response, range from less than £30,000 up to £62,000 for the years 1954-5-6. Did food manufacturers regard £62,000 an excessive annual expenditure for centralised research on the many problems encountered in the whole of their undertakings? Or was their belief in the practical applications of science great enough to move them to ensure that this sum was available? Was the situation of rising production costs to be met by miscellaneous petty economies or by basic improvements? Even at the best level, some of the main stages of food manufacture were still so empirical that results were not satisfactorily under control and fundamental improvement remained a remote possibility.

It was not possible clearly to separate the annual research and development expenses from the different groups of industries; with the two expenses combined, however, and represented as a percentage of turnover, there was a spread from 0·5 per cent. up to 5·0 per cent. Food, drink, tobacco, textiles, and ferrous metals were all in the lower group and if the research provisions of the very large units in food manufacture were excluded from that estimate, there would be a large residue of the industry contributing to research in a manner doing it little credit.

As a result of the information made available following the visits of productivity teams to America, it was found that although comparative expenditure on science for the benefit of industry was not satisfactorily measurable, it could be illustrated by the fact that, with allowances for population, though not for cost differences, America seemed to be spending seven times as much as Great Britain on research in science and engineering in the Universities.

In this connexion, Sir Frank outlined the research work undertaken by the Departments of Food Technology of a number of the State Universities, in the large number of State and Federal Research Stations, and in the Nutrition Foundation Inc.

In Britain, although the advantages to Universities of contact with industry were well understood, it was firmly held that the prime function of University science was advancement of fundamental knowledge. Organisations maintained by the D.S.I.R. helped to develop fundamental knowledge in directions which seemed specially necessary or promising for industry. In the case of food manufacture, the responsible body was the Food Investigation Organisation; others concerned were the various Departments of State, especially the Ministry of Food which, by well-designed arrangements, accorded to

the F.I.O. and the B.F.M.I.R.A. ready access to its extensive knowledge and its facilities for survey, trial, and experimentation.

It was of the utmost importance for their own well-being that British food manufacturers should understand the strength and high quality of the scientific resources at their disposal. For a considerable number of firms, the research association offered the sole hope of progress through application of science, and for a good many others it was an indispensable adjunct to their own scientific endeavours.

A suggestion which merits serious consideration was then put forward by Sir Frank. In agriculture everywhere, he said, because the small, often very small, production unit predominated, Governments had found it necessary to make special provision for technical advice. Why not provide the money for a small well-qualified advisory staff for food manufacture? Such a unit, by demonstrating to the smaller production units the scope for scientific aid, would be certain to bring many new members to the research association, and it was in the research association that the development of such a service could best be achieved.

Herring Survey

REFERRING to the visit by technical experts to the U.S.S.R., Sir Frederick Bell, chairman of the Herring Industry Board, recently said that, in his opinion, it was only by means of such visits that difficulties could be smoothed over. The party, which included representatives of the British Herring Trade Association, the Association of Herring Merchants, and the Herring Industry Board, had been very favourably received, and in two days had reached complete understanding. Since the deal involved other commodities, it was not possible to give details, but he was confident that useful business would result at satisfactory prices.

Commenting on developments since the start of 1953, Sir Frederick said that, as in white fishing, recession in the herring industry had been experienced; on the subject of misconceptions regarding prices, he criticised loose talk and loose thinking; it was a mistake to think and talk in terms of consumers and producers, as all were both producers *and* consumers and it was impossible to give consumers lower prices while producers insisted on higher prices for their products. If fishermen sold herring at one penny per lb. less than at present not a single boat could make ends meet.

Trade with Egypt and Greece had been difficult, but prospects for canned sales in overseas markets were less gloomy, although substantial trade barriers still remained to be swept away; oil and meal production was being given attention and a complete technical revision had been carried out. During the next 18 months a maximum effort would be required to ensure adequate supplies of protein feed for the agricultural production programme and the Board was planning accordingly; a new factory was planned for Peel, in the Isle of Man, capacity at Yarmouth was being doubled, and improvements were being carried out in Stornoway.

Sir Frederick stressed the need to devise an acceptable and workable control of quality so that public confidence could be maintained, and bulk supplies secured on every possible occasion.

Experimental packs of quick frozen fillets sent to America had been completely disposed of and the Board would be giving this trade their attention. Publicity would be concentrated on the greater use of demonstrations and films as well as on the continuation of local efforts, while major attention would be given to selective marketing and continuity of trading on a maximum basis.

Processed Food

THE report of the recent debate on processed foods in the House of Lords occupies no less than 32 pages of Hansard.

Lord Teviot opened the proceedings by roundly condemning canned foods, Agene, toxic chemicals used in agriculture, and "doctored foods" of all kinds. He quoted from a Ministry of Health report in which was published a table showing that there had been 15 cases of poisoning from canned fish during 1951. Lord Teviot compared this with the other foods cited in the table, to the detriment of canned fish; his omission of the same figure for eggs savoured either of carelessness or special pleading.

Most of the arguments put forward in the debate made familiar reading, especially those relating to Agene. One of these days, the use of this much maligned substance will be prohibited in Britain as it has been in America, and the absence or otherwise of the ailments attributed to it may then be demonstrated by posterity. In the meantime, bread from "untreated flour" is available for those who want it.

In his reply to Lord Hankey's discussion on the subject of Agene, Lord Horder, in his amiable way, criticised not only the science but also the logic of previous speakers. To the former's assertion that coronary thrombosis may be caused by Agene, Lord Horder replied that in New Zealand, where it is not used, the incidence of that disease is equal to that in Britain. This appeared to us to be the type of argument his Lordship was criticising.

Some who read the account of the debate will doubtless repeat Dean Swift's words—"'that was excellently observed,' say I when I read a passage in another where his opinion agrees with mine. When we differ then I pronounce him to be mistaken."

Malthusianism—An Indian View

INDIA is often cited as an example of Malthusian tenets in relentless operation, and a modern opinion from that country is therefore significant. Commenting upon the 1952 Mysore conference on India's food problems and the development of her food industry, B. Viswanath (*J. Sci. and Ind. Res.*, **12**, 3, 143) points out that in his own time Malthus was a passive spectator of food production from the land. Agricultural science has transformed the conceptions of land productivity. Food production today is not the result of earth plus man but of the earth multiplied by man.

At the same time, Viswanath discounts the contribution of India's expanding food industry. Processing farm crops into more refined products, he says, is no solution for augmenting food supplies. It is far more likely to involve hardship for the poorer sections of the population, whose purchasing power is already low. By drawing away foodstuffs that are already consumed in simple forms, food industry development can intensify food scarcities.

Against the background of India's basic poverty, the only useful contribution that could be made by the expansion of an Indian food industry is the processing into edible products of plants and animals that are not at present eaten by large sections of the population. This is sound enough argument but an obvious case of an animal whose flesh and produce is not eaten in India for religious reasons will occur to most western minds. The task of turning the uneatable into the eatable in a country of such fixed beliefs is surely too heavy to be laid upon an industry hardly out of its infancy.

Biological Value of Proteins

A NEW method of measuring the biological value of proteins, which has decreased the amount of time normally spent for this work, has been devised by Dr. A. E. Bender and co-workers at The Crookes Laboratories.

The classical method, that of Thomas and Mitchell, involves five 10-day periods for the collection of urine and faeces and requires 120 estimations of urine and 120 of faeces nitrogen for the measurement of three proteins simultaneously. With the new method, the biological value of seven proteins is measured simultaneously in a 10-day period and the only nitrogen estimation involved is that on the diet.

The method consists of the feeding of one group of rats on a non-protein diet for the period of experiment, during which time the rats lose nitrogen for endogenous purposes, and the other groups are fed the various test proteins. At the end of the period, the carcass nitrogen of the non-protein group is subtracted from that of the fed group. This figure divided by the nitrogen fed is equal to the net protein utilisation, *i.e.* biological value × digestibility.

The necessity for nitrogen measurements has been obviated by the finding that there is a constant ratio between nitrogen and water in the body of the rat, depending only upon age. At the end of the experiment it is therefore necessary merely to determine the dry weight of the rats and multiply by the previously established ratio.

The beauty of this method lies in the ease with which large numbers of biological values can be determined, thus enabling problems to be tackled which in themselves are only minor but which by the classical methods of biological value estimation would involve a major experiment. For example, the question has frequently been asked as to why gelatin, which is completely deficient in tryptophan, should have any biological value at all, although it is quoted in literature with a biological value of 25.

It has not apparently been worth anyone's while to devote two months to answering this question, but Dr. Bender has found it simple to include this measurement along with his ordinary work and he has found that, as expected, gelatin really has a biological value of zero.

Essential Oils and Food Spoilage

BECAUSE of their widespread use in many food products, the possible effect of essential oils and spices on the inhibition and thermal resistance of potential spoilage micro-organisms in such foods has been of interest for many years. A considerable amount of work has been reported on different aspects of this problem, but the results obtained have not provided a clear-cut picture.

The inhibitory effect of certain essential oils is well known, and such action may be selective towards certain micro-organisms. That this action may also be influenced by the nature of the substrate and other factors has been reported but little information on the effect of essential oils on the thermal resistance of micro-organisms associated with food spoilage has been published.

In the course of work on the preservation of fruit juices and acid food products, such as that on fresh pack pickles, E. E. Anderson, W. B. Esselen, Jr., and A. R. Handleman of the Department of Food Technology, University of Massachusetts, have considered the role of essential oils in the preservation of such products. (*Food Res.*, **18**, 1, 40.)

Studies were conducted on the minimum concentrations of various essential oils necessary to prevent the growth of *Leoconostoc mesenteroides, Saccharomyces cerevisiae, Saccharomyces ellipsoideus, Lactobacillus lycopersici, Zygosaccharomyces globiformis*, and yeast spoilage organism No. 7D in dextrose broth at *p*H 7·2; these revealed a wide varia-

tion in the effectiveness of the oils. Of the 12 considered in this investigation mustard, garlic, onion, and cinnamon had the greatest inhibitory activity.

When the *p*H of the dextrose broth medium was lowered to 4·0, 4·5, or 5·0, depending upon the growth requirements of the test organisms, the inhibitory action of most of the essential oils was increased. Only the yeast spoilage organism No. 7D consistently required as high or higher concentrations of the essential oils at the lower *p*H level.

Within practical limits, concentrations of clove, cinnamon, and garlic dill flavour oils had little effect on the thermal resistance of spores of *Bacillus thermoacidurans* in tomato juice at 212°F. Comparable concentrations of garlic oil were much more effective.

Cinnamon and garlic oils were more effective than clove and garlic dill flavour oils in lowering the thermal resistance of the yeast spoilage organism No. 7D in a brine (0·5 per cent. acetic acid and 5·0 per cent. salt).

"Soft" X-rays in Food Sterilisation

As a result of research conducted at Battelle Institute, Columbus, Ohio, it has been found that "soft" X-rays, those radiations produced at a comparatively low voltage, have unusual ability to penetrate substances and completely destroy those organisms that cause their deterioration and spoilage.

These rays are readily and effectively absorbed by materials. The incident radiations, together with the secondary radiations, produced within the material during absorption, destroy the moulds, viruses, and yeasts, as well as the vegetative and spore forms of bacteria and other organisms present in the material treated. Sterilisation may be effected at room temperature, no preliminary heating or cooling of the material being necessary to kill the micro-organisms.

The use of massive dosages of tremendous X-ray flux density decreases the exposure time required to destroy the micro-organisms as compared with dosages produced by ordinary X-ray equipment.

Since precooling is not necessary, frozen material can be treated without melting for a longer preservation time or for complete sterility with no undesirable effects. Since no considerable heat or pressure need be applied, sterile containers of new and inexpensive materials may be utilised. Fibre, paper, plastics, thin metals, and foil can be used, and products can be sterilised in bulk or in containers.

According to Dr. Robert C. McMaster, of the Battelle staff, who conducted the experiments in collaboration with Dr. R. F. Robinson, the potential economies of sterilisation by this method are very attractive. The requisite equipment is not bulky and is relatively inexpensive. The production line could be automatic, or nearly so, and would not require a trained X-ray operator. The working hazards are negligible as the soft rays are easily stopped by thin layers of lead and certain other metals, and the unit can be shielded economically for the complete elimination of danger to personnel.

This new industrial sterilisation process is the result of several years' research at Battelle, and it is considered to be particularly promising in its applications to meats, vegetables, fruits, beverages, pharmaceuticals, and other packaged materials.

Eating Anything

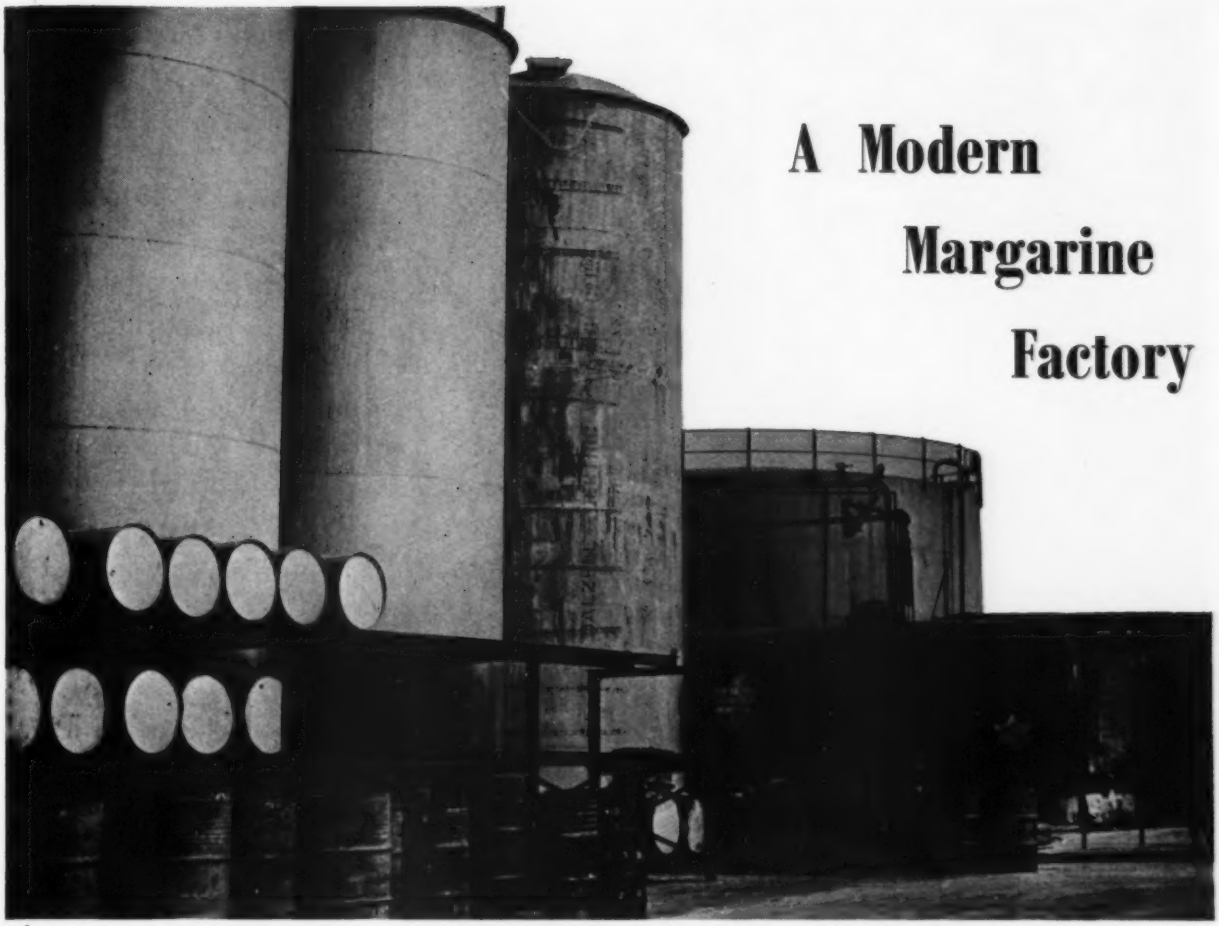
"THEY think we'll eat anything!" said the woman at the butcher's shop after describing her attempts at boiling, stewing, and simmering ewe mutton for hours on end in an effort to make it fit for the dining-table. Other complaints related to its toughness after two hours' steam-roasting, or the way in which it "fell away into string" after excessive boiling. There were references to the rejected offer of ewe mutton made by Fylde coast butchers to the Blackpool Tower Zoo. As the curator remarked: "Most of the animals are pretty temperamental about changes of diet."

Reverting to the first woman's comment, past pioneers who literally did eat anything are brought to mind, when London was entertained by sword swallowers (whom in fairness we will not count), and by eaters of tin tacks and of stones, the latter "indigestible meal" being claimed "to be heard to clink in his belly." There were the fire-eaters described by Evelyn and others, men who broiled an oyster (though not ewe mutton) on live coals on their tongues. Even our learned Royal Society of 200 years ago found time to watch Robert Powell consuming molten wax, sulphur, and lead.

But to return to 1953—what gluttons for documents were those Italian ladies who consumed wills and certificates in lawyers' offices at Bari and Rome! With such a passion for paper-eating that a law now makes it a punishable offence in Italy thus to dispose of documents, perhaps those dear old ladies would consume even the wrappings round butchers' meat, as well as the mutton within. All of which causes us to regret the decline of the papyrographists, those heroes of our boyhood reading who would eat secret missives rather than let them fall into the hands of the enemy.

We have ourselves metaphorically eaten our words, swallowed our pride, and consumed our rage when any particularly annoying idiosyncratic regulations of officialdom thrusted themselves upon our notice, but those were forgotten as we mused over the Ministry's ewe mutton refused by those Blackpool lions, all sounding like a revised version of the lion refusing to lie down with the lamb.

A Modern Margarine Factory



A rail tanker being unloaded into the crude oil storage tanks. In the background is the hydrogen gasometer.

It was in 1916 that the founders of Western Margarine Ltd. started work in a tiny factory in Paddington, London. Margarine, they decided, had come to stay. The early days of struggle followed the pattern of so many other manufacturers, but after 17 years of progress, the firm's product was established. On January 1, 1933, Western Margarine Ltd. came into being at Western Avenue, then one of London's newest factory areas.

AN outstanding aspect of this enterprising company is the housing in one great building of the three major processes involved in the manufacture of margarine. The refining of the crude oils, their hydrogenation, and their conversion into margarine, compound fats, frying oils, and pastry margarines follow what is virtually a continuous process.

The crude oils come from many parts of the world—groundnut oil from West Africa and occasionally China; palm oil from Malaya; palm kernel oil from Africa and the Dutch East Indies; and whale oil from the Antarctic. Daily deliveries of these crude oils are made to the Acton factory by a fleet of seven road tankers; alongside is the company's railway siding, from which rail tankers also discharge their quota of the raw material, but road transport by the company's own fleet is rapidly superseding rail handling. The oils are pumped from the articulators into storage tanks of varying capacity, the largest holding 150,000 gallons.

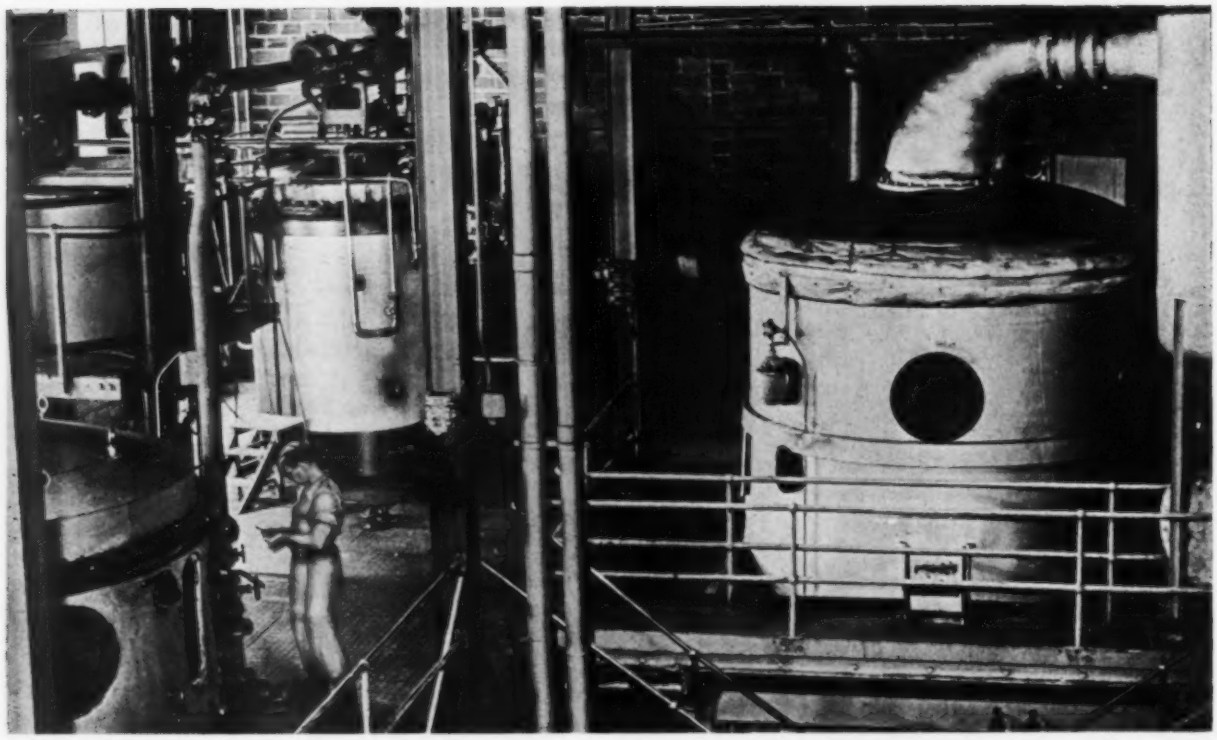
Treatment of the Oils

Within the refinery, the oils flow from one container to another. Each vessel, with its auxiliary equipment, deals with one phase of the complicated process of oil refining. The oils are first treated with caustic soda to remove free acids; they are then water washed and vacuum dried. Bleaching by treatment with fuller's earth, and deodorisation at high temperatures with steam, come next. Although all oils receive the same general treatment, some minor modifications, such as the by-passing of certain intermediate stages, are effected with some of the oils, for example whale oil and groundnut oil.

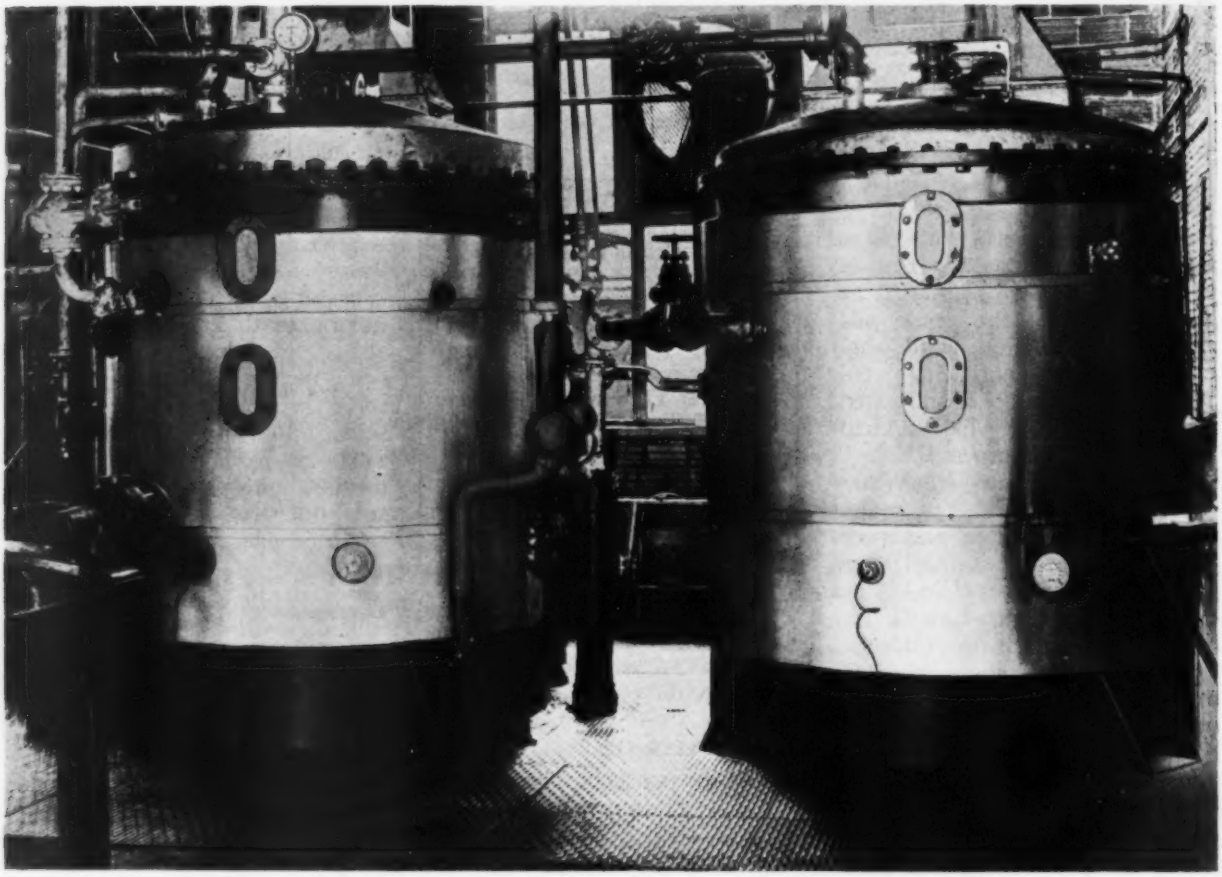
Hydrogenation

The next stage is the now well-known hardening process, or hydrogenation, briefly consisting of treatment of the oils with hydrogen in the presence of a catalyst.

The vast quantities of hydrogen required for this process are produced by the company's own plant, which is separately housed within the factory. The gas is



Within the refinery, the oils flow from one container to another. On the right is the deodorising plant and left of centre is the upper part of the hydrogenation plant.



The upper part of the hydrogenation plant.

obtained by the electrolytic dissociation of dilute solutions of caustic alkali, the cells used being the Knowles type. The hydrogen is drawn off and stored in a gasometer in the grounds. To supply the current needed by this plant, a 350 h.p. generator set, in the company's sub-station, produces direct current at the rate of 2,000 amperes.

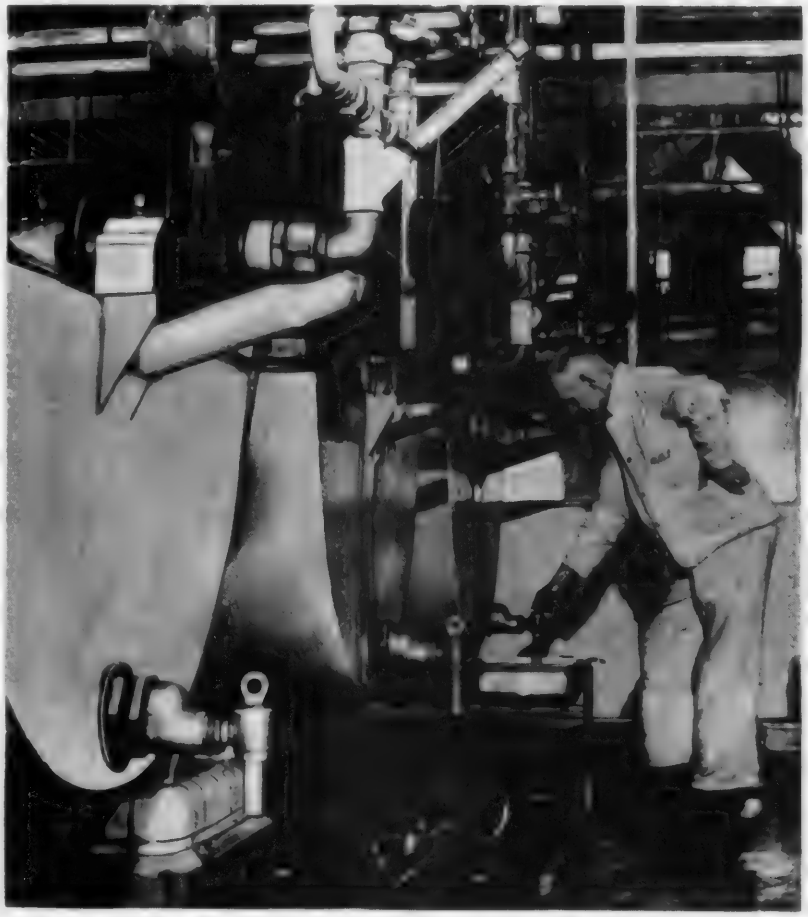
The catalyst, which is prepared by the carefully controlled reduction of a nickel salt in oil, has the appearance of a black sludge when it is added in measured quantities to the refined oil.

As hydrogen passes through the oil, exothermic reactions cause the temperature within the autoclave to rise to 180°C. and over.

During the process, the melting point of the oil is gradually raised, and at its conclusion it leaves the autoclave with a setting point corresponding to solid fat. This process also eliminates the fishy taste and odour from marine oils.

The hot oil now passes through filtration plant to remove the nickel. To ensure absolute purity, and 100 per cent. effectiveness of cleaning, filtering, and deodorising, some of the initial processes to which the oils have been submitted are repeated.

Part of the hydrogen producing plant.

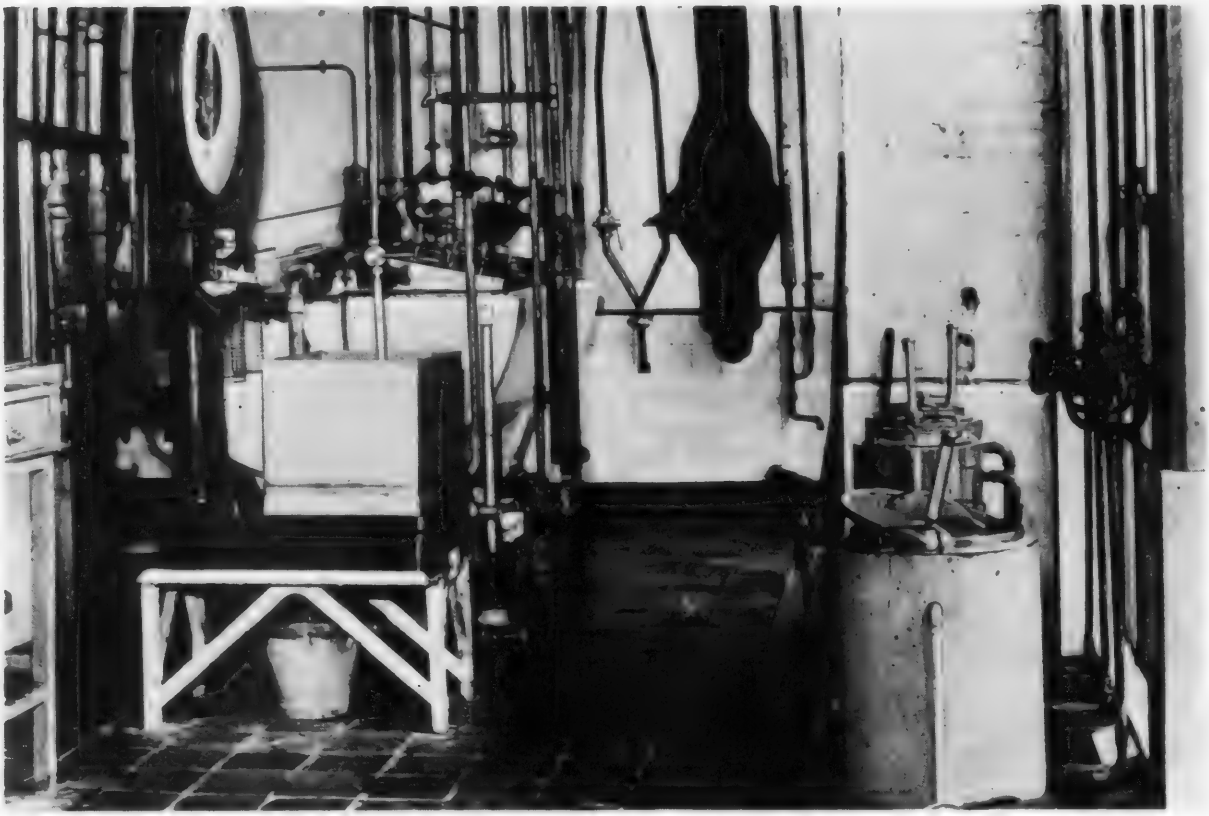


In the dairy department, the milk is pasteurised, inoculated with a lactic acid culture, and ripened overnight.

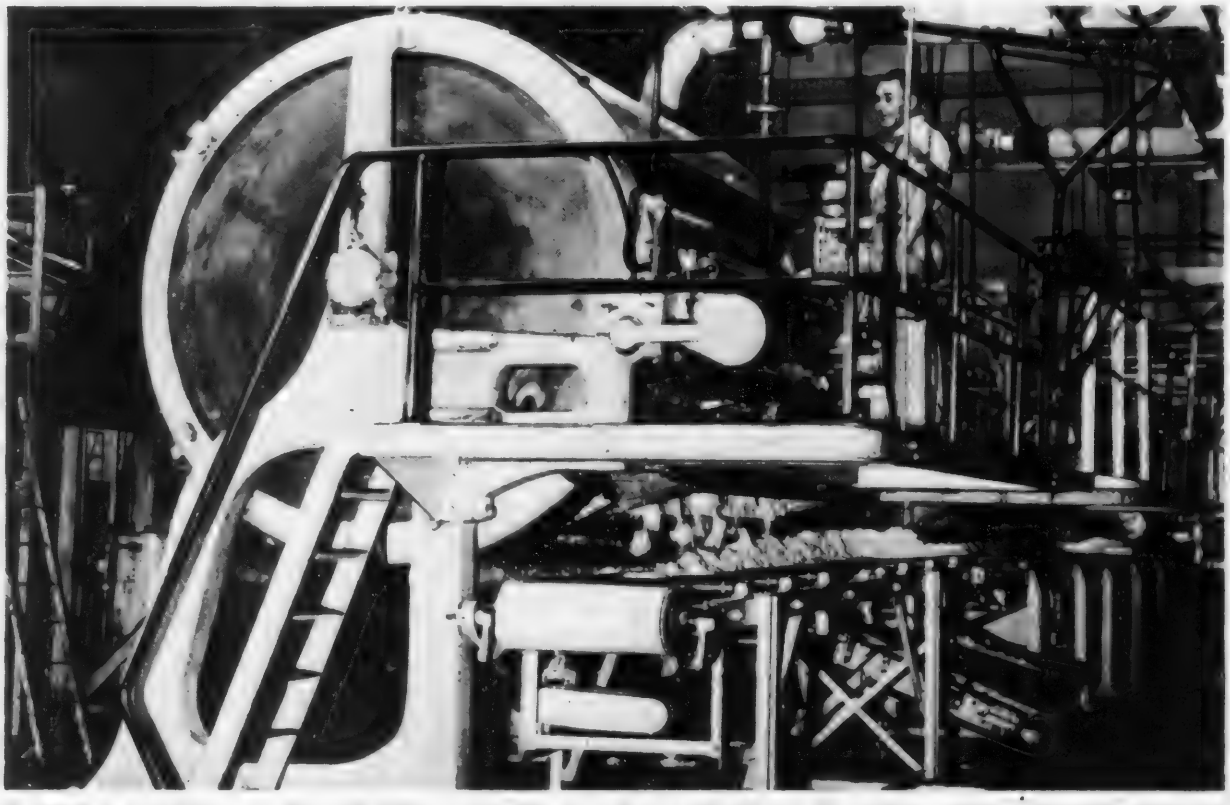
Blending the Oils

A weighed amount of each of the various oils being used is piped from the refinery storage at varying temperatures to a weighbridge tank in the margarine factory. The blend varies from time to time, in accordance with the seasons, thus ensuring that the margarine is equally spreadable in summer and winter. The contents of the tank are then run into one of the tempering tanks below, in which they are blended and brought to the correct temperature before passing to the emulsifying churns.

The flow of production in the margarine factory follows the form of a capital T. The oils flow



The salt which is added to the ripened milk in the brine preparation section of the dairy is prepared in the form of a brine to prevent the outflow of soured milk from clogging the channels along which it is gravity fed to the churns.



The revolving steel drums are internally chilled, causing the margarine to set hard upon the exterior. Scrapers remove the margarine which falls in flakes on to the conveyor band below.

along one horizontal arm of the T; flowing from the opposite arm comes the processed milk. The two meet at the emulsifying churns which stand at the uppermost end of the T's vertical line. It is at the churning stage that the vitamins A and D are added.

Work of the Dairy Department

Daily deliveries of fresh milk are made to the dairy. The milk is pasteurised, inoculated with a lactic acid culture, and ripened overnight. The salt which is added at this stage is prepared in the form of a brine, to prevent the outflow of the soured milk from clogging the channels along which it is gravity fed to the churns and, at the same time, inhibiting the growth of undesirable bacteria in the passages.

Kneading and Packaging

From the emulsifying churns, the warm liquid margarine is thinly deposited on the surface of revolving steel drums. These drums are internally chilled, whereby the margarine immediately sets hard upon the exterior. On completing almost the full

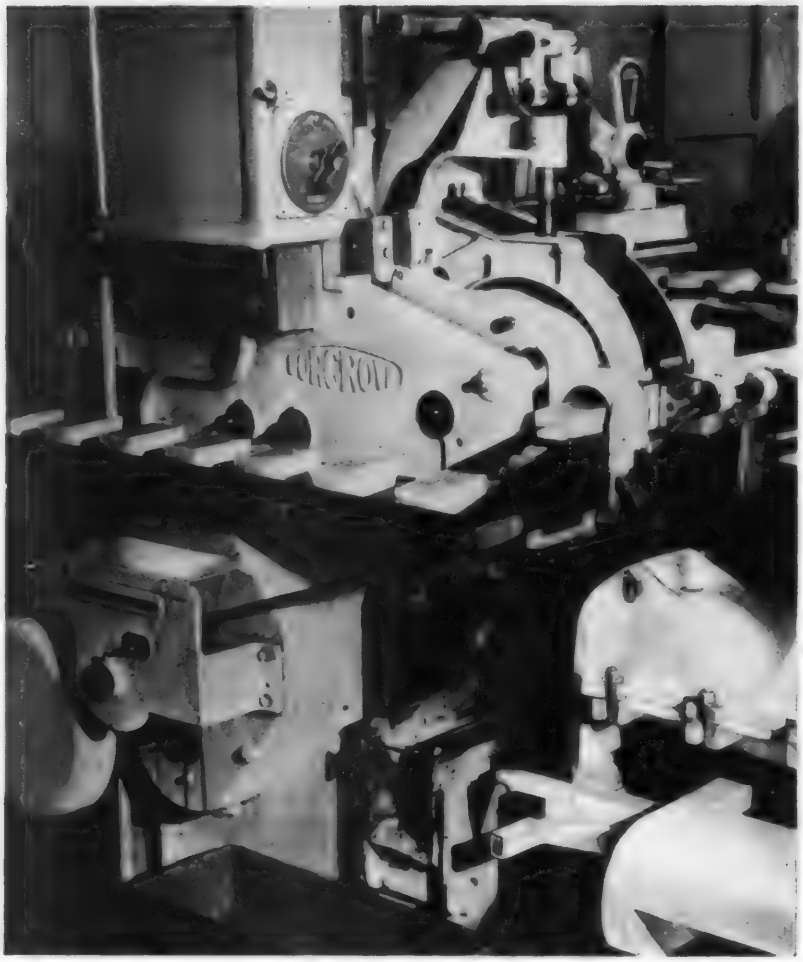
At the meeting of the conveyor belts, the flaked margarine is carried upwards and delivered to the plasticising machines.

circle of revolution, scrapers remove the margarine which falls in flakes on to the conveyor band below, and thence to the kneading unit. This machine rolls and plasticises the margarine in a vacuum which prevents aeration of the product. It is this process which finally gives to it its butter-like consistency. From this stage, the margarine passes to the wrapping and packaging plant.

The ammonia refrigeration plant is sited immediately to the rear of the point at which it is mainly utilised.

In the printing department on the first floor the rolls of vegetable parchment are unrolled, printed, cut, and stacked, and conveyed to

The finished product leaves one of the plasticising machines and is conveyed to the wrapping plant.



The margarine passes through one of the packaging machines.

the packaging machinery on the floor beneath. The company has also a very fine box-making plant.

The well-equipped laboratory houses a pilot plant. In the constant search for improvements, and in testing new techniques, this plant is constantly in use.

Cheerfulness and efficiency are the watchwords at this factory, in which all departments work together in harmony. A family atmosphere prevails: for instance, in the staff canteen sit the members of the Board of Directors interspersed among the employees.

Near the canteen, which is effectively organised by outside contractors and subsidised by the company, are the maintenance workshops. One of these is devoted to the requirements of the factory plant, the other to those of transport. All mechanical maintenance, and also painting, is carried out here.

Distribution of goods from the Acton factory is effected by a fleet of 10 long-wheelbase 5-ton wagons. Under present arrangements of Government control the whole production is simply delivered to Ministry of Food depots on the Ministry's instructions. A proportion is for export to colonial markets, but this also comes under Ministry arrangements.

Staff Welfare

Incentive is provided by means of a production bonus to all the staff. Pensions are also assured, this scheme including life assurance.

An interesting feature of social activity is the reciprocal arrangements with the Scottish factories. Under this plan, about five per cent. of the staff make an annual trip of several days' duration to these factories, whose staffs provide a full programme of entertainment. The Acton factory staff in their turn act as hosts to their contemporaries from over the border.

The executives of the company are chosen from among its own workers. Thus the present Board of Directors have all passed through the ranks. Almost without exception those occupying such posts today include the early pioneers of the company.

SUPPLIERS OF EQUIPMENT

Lancashire boilers: *John Thompson Engineering Co.*
Refrigeration plant: *L. Sterne and Co.*
Packaging machinery: *Forgrove Machinery Co.*
Dairy equipment: *Dairy Supply Co.*
Refining plant: *Geo. Scott and Son (London).*
Storage tanks and hydrogenation plant: *Bamag.*
Hydrogen plant: *International Electrolytic Plant Co.*
Pumps: *Tangyes.*
Water cooling tower: *James Slater and Co. (Engineers).*
Hydrogen gasometer: *Horseley Bridge and Thomas Piggott.*
Delivery vehicles: *Vauxhall Motors.*
Stainless steel churns: *Metaducts.*
Compound Votators: *Girdler Corporation.*
Carton sealing machine: *Rose Brothers (Gainsborough).*
Automatic conveying system: *N. Acton Conveyor and Elevator Co.*
Internal telephone and staff location system: *Dictograph Telephones.*
Time recorders and automatic time signals: *Telephone Rentals.*
Tiled flooring: *Wiggins-Sankey.*
B.E.V. fork-lift trucks: *Wingrove and Rogers.*

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The Leonard Hill Technical Group

Articles published in some of our associate journals in the Leonard Hill Technical Group this month include:

Manufacturing Chemist.—Antibiotic Research in Somerset; Dextran and its Derivatives; Comparative Activity of Phenyl Mercury Compounds.

Chemical & Process Engineering.—Review of Catalysis; Chemical Plant Exhibition.

Atomics.—Atomics in Industry, Part 2.

Building Digest.—Post-war Building Progress in Germany.

Muck Shifter.—The Reconstruction of the North Docks of the Port of Liverpool.

Antioxidants in Foods

The Minister of Food has approved for publication a report, which has been presented to the Food Standards Committee by its Preservatives Sub-Committee, recommending that the Public Health (Preservatives, etc., in Food) Regulations should be amended so as to deal with and authorise the addition to foods of specific antioxidants.

THE actual terms of reference of the Sub-Committee were "to review the Public Health (Preservatives, etc., in Food) Regulations and make any recommendations considered desirable for the amendment of the Regulations."

In their report, the Sub-Committee state that these terms of reference justified the inclusion in the investigations not only of the addition to foods of preservatives and colouring matters, by virtue of their inclusion in the present Regulations, but also of substances, such as antioxidants, anti-staling agents, anti-mould agents, and stabilising and emulsifying agents.

In view, therefore, of the wide and varied range of substances, the Sub-Committee decided to report upon each class of substance separately.

Early consideration of antioxidants was thought desirable because this subject was not dealt with by the Departmental Committee appointed by the Minister of Health in 1923 to enquire into the use of preservatives and colouring matters in food, and because if antioxidants were held by a Court to fall within the definition of "preservative" in the Regulations, their use in foods would infringe them. In view of the accepted use of antioxidants in some other countries and the possible importation into this country of foods so treated, it is important that the legal position should be clarified as soon as possible.

General Observations

Fats become rancid on storage, especially in contact with air, thereby developing unpleasant odour and taste. Rancidity may be brought about by the action of air (oxidative rancidity) or by the action of micro-organisms (ketonic rancidity). No sharp differentiation between the two types is possible, and only the former, the chief cause of rancidity in fats, can be controlled by antioxidants, unless, of course, the antioxidant also has antiseptic properties.

Oxidative rancidity is accelerated by exposure to light, by moisture, by traces of copper, nickel, iron, or manganese, and by storage at elevated temperatures. Conversely, careful processing, with minimum exposure to air, followed by storage in suitable containers at low temperatures, will tend to improve the keeping properties of fats.

The precise mechanism of the chemical changes which take place when fats become rancid is not fully understood, but it is now accepted that oxygen is taken up by the fat with the formation of compounds which react as peroxides. The rate of oxygen absorption depends upon the constitution of the fat; in general, fats containing unsaturated fatty acid groups are more reactive than those containing saturated acids.

Indications of Rancidity

When the concentration of these "peroxidic" compounds in the fat reaches a certain level, complex chemical changes occur. The volatile decomposition products formed, rather than the "peroxides" themselves, are responsible for the unpleasant taste and odour associated with rancidity.

Taste and smell are the most reliable indications of rancidity; the progress of the decomposition of fats can be followed, however, by determination of the peroxide value or by estimation of the decomposition products.

The formation of peroxides is slow during an initial or induction period. At the end of this induction period, there is a more or less rapid increase in the peroxide value and it is at this point, or shortly after, that rancidity can be detected by taste or smell.

The induction period may vary from a few weeks to several months. This variation is attributable to the presence, especially in vegetable oils and fats, of minute amounts of naturally occurring substances which inhibit oxidation. These are retained in the crude oils but may be largely removed during the process of refining. Few of these natural antioxidants, of which the best known are the tocopherols, have been isolated.

Properties of Antioxidants

Substances which retard or prevent the development of rancidity are termed antioxidants. For the purposes of this report, this term is restricted to substances the major use of which is for preventing or retarding oxidative deterioration of food, and does not, therefore, include foods such as sugar, cereal oils, flours, herbs, and spices which may possess some intrinsic antioxidant properties.

Antioxidants serve only to prolong the storage period of a well-prepared fat and are, therefore, not open to one of the main objections to the use of germicidal agents in foods, *viz.* that they may mask the decomposition or deterioration of food. They cannot be used to mask rancidity once it has developed, nor can they be used to render a rancid fat palatable.

With most antioxidants, there is an optimal level above which further additions do not give a corresponding increase in stability. Thus, little or no increase in stability is secured by adding tocopherol to vegetable oils already containing the optimal amount. Furthermore, the use of excessive amounts of antioxidants is likely to have a detrimental effect on flavour and colour.

A functional property of importance to some sections of the food industry is the capacity of an

antioxidant, when added to fat, to continue its protective effect in baked or fried foods containing such fat—the so-called "carry-through" property. Antioxidants differ considerably both in their carry-through properties and in their efficacy in preventing rancidity in emulsions of fat and water. This probably accounts for the present trend in America to use mixtures of antioxidants.

The action of antioxidants is frequently enhanced by the addition of small amounts of harmless organic acids such as citric and tartaric acids. This is termed a "synergistic effect" and the substances inducing it are known as "synergists."

An ideal antioxidant for use in food should:

(*a*) itself be harmless, and in use should form no harmful product;
(*b*) give a useful degree of stability;
(*c*) be readily dispersible in the food;
(*d*) not impart to the food any foreign odour, flavour, or colour, even after heating or on long storage.

Uses of Antioxidants

While hitherto the main use of antioxidants has been for addition to edible oils and fats, proposals have in recent years been made for their use in a variety of fat-containing foods, such as pork, bacon, fish, milk powder, synthetic cream, mayonnaise, and edible nuts, and also for fruit juices, cut or pared fruits, vegetables, and essential oils.

Antioxidants are usually most effective when incorporated uniformly throughout the food, but other methods of application have been proposed, such as the treatment of exposed surfaces by dipping or spraying, or by the use of wrapping or packaging materials impregnated with an antioxidant.

Ascorbic acid (vitamin C), and its synthetically produced isomer d-isoascorbic acid, both water-soluble substances, have been used successfully for the prevention of browning in frozen fruits. The amounts employed range from 75 to 200 mg. per pound of pack according to the nature of the fruit.

Canada and America have regulations specifying the antioxidants and maximum quantities which may be used in edible oils and fats. The lists of antioxidants permitted in these two countries are not identical, but of the synthetic substances allowed, propyl gallate and butylated hydroxyanisole are common to both; the maximum amounts permitted in both countries are 0·01 per cent. and 0·02 per cent. respectively. The Canadian regulations also permit ascorbic acid, up to a maximum of 200 mg. per pound, to be added to frozen fruits.

The principal issue is whether under the conditions prevailing in Britain a case can be made out for the addition of antioxidants to foods. If so, the following questions arise:

(*a*) what antioxidants should be permitted;
(*b*) in what foods they should be allowed, and in what amounts;
(*c*) whether their presence in food should be disclosed; and
(*d*) whether, when used, their presence can be detected and the amounts determined.

Representations from the Trade

Most technical and trade witnesses suggested that the controlled use of antioxidants in fats and certain fat-containing foods should now be permitted, but that consideration should be restricted for the present to those antioxidants permitted in America. At the same time, they suggested that provision should be made for the amendment of any approved list, emphasising that otherwise research or technological progress would be impeded.

Antioxidants are not at present used in foods manufactured for sale in the United Kingdom, because of the doubt whether, under the existing regulations, their use would be within the law.

Natural food constituents such as citric, tartaric and ascorbic acids, lecithin, and tocopherols, which possess some antioxidant properties, are, however, commonly used as ingredients of foods but not necessarily for antioxidant purposes. Synthetic antioxidants are occasionally used in British foods intended for export, and were antioxidants permitted in Britain such foods could be sold on the home market in the event of exports being frustrated.

Fats and Oils

It was stated that margarine on storage undergoes subtle changes of flavour and texture. Experiments had been conducted with most of the known antioxidants, but none had been found altogether satisfactory; the majority had an adverse effect on the flavour. The search for an ideal antioxidant for margarine continues, and it was urged that, should a suitable antioxidant be discovered, the trade should not be precluded from submitting a case for its use.

Although fats, such as lard, cooking fats, etc., containing little or no water, do not present so acute a problem of deterioration as does margarine, the use of antioxidants in these fats should not be ruled out.

The bulk storage of crude vegetable oils and fats presents no serious problem, but in the case of animal fats and fish oils, which are liable to more rapid oxidative changes, the use of antioxidants might be advantageous.

Adverse effects have been shown to follow the prolonged experimental feeding of rancid fats to animals. Such feeding produced ophthalmia, gastric disturbances, reproductive failure, and anaemia, effects which it has been suggested may be due to the destruction of vitamins and other dietary essentials. It was claimed that antioxidants, by preventing rancidity, would avoid the destruction of fat-soluble vitamins.

Increasing Shelf-life

The chocolate and sugar confectionery trade anticipated that with the removal of rationing and allied controls the use of antioxidants might become necessary to provide for longer shelf-life than obtains under present conditions. Any increase in the public demand for greater variety would also aggravate this difficulty.

It was stated that essential oils used for flavouring purposes, and in particular the citrus oils, are liable to develop off-flavours. This could be prevented by the addition of an antioxidant.

There was an increasing tendency on the part of the manufac-

turers of cake and pudding mixtures to market a "complete mix" which includes both fat and dried milk ingredients. The use of an antioxidant was considered necessary to ensure a reasonable shelf-life for such products.

Changes in the Bakery Trade

In the bakery trade important changes are proceeding. In some sections of the industry the preparation of baked foods is now largely concentrated in a few central factories from which distribution is made over wide areas; thus the period between manufacture and retail sale is considerably increased. To facilitate handling it is now the accepted practice to store bulk fat at the central factories in the liquid state at temperatures a few degrees above the melting point, a condition favourable to oxidative deterioration. During the transportation and storage of products, such as cakes and biscuits, the "oiling-out" of the fat on to the wrappers favours the development of rancidity.

For these several reasons the bakery trade felt that the use of antioxidants would be of great benefit, and laboratory experiments carried out with butylated hydroxyanisole and dodecyl gallate, both of which have good "carry-through" properties, indicated that these antioxidants would be of value to them. Baked products containing fats to which these antioxidants had been added had improved keeping properties, and it was claimed that both the industry and the public would benefit from this, particularly when the products were to be stored for long periods.

Need for Official Guidance

. It was generally accepted by the witnesses that no substance should be added to food until it had been subjected to adequate chemical, physiological, and toxicological tests, and that before any new substance is used in food, the manufacturer should produce satisfactory evidence of harmlessness. The investigations necessary are both costly and lengthy, and it was urged that some official guidance should be given as to what would be regarded as acceptable criteria of harmlessness. Witnesses also considered that an impartial body, with which the food manufacturing industry would wish to be closely associated, should be made responsible for assessing, from the experimental data presented, the suitability of any substance proposed for use in foods.

Were antioxidants permitted, witnesses agreed generally that the food manufacturer should be informed whether any food ingredients purchased by him contained antioxidants, and if so, of their nature and amount. If this could not always be done by labelling, *e.g.* when fats were delivered by tanker, it was suggested that the information should be given on the invoice. There was some difference of opinion whether the declaration of added antioxidants on the labels of packed foods sold by retail was necessary.

Other representations received related to the need for the addition of antioxidants to soups or soup mixes containing chicken fat, in view of the rapidity with which this fat became rancid, and for consideration to be given to the use in foods of certain proprietary antioxidants permitted in some other countries.

Necessity for Strict Control

Exposure to light, storage at high temperatures, and contamination by traces of certain metals are factors which accelerate the development of oxidative rancidity in oils and fats, whereas selective hydrogenation and packaging in vacuum or in an inert gas tend to retard it. It is the Sub-Committee's opinion that good manufacturing practice should take cognisance of these facts, although it is realised that it may not always be practicable to observe these several precautions, nor can their adoption be guaranteed to prevent the development of rancidity, especially in foods which are to be stored for prolonged periods. The use, under strict control, of antioxidants appears to be the most practical means of securing the requisite degree of stability and, therefore, to be justified, on the grounds of avoidance of wastage and to ensure that the food reaches the consumer in an acceptable condition. For obvious reasons, these factors may at any time assume greater importance.

Accordingly, no objection is raised to the existing practice of adding to foods small quantities of such naturally occurring antioxidants as lecithin, ascorbic acid, and tocopherols, or of the synergists, citric or tartaric acids, all of which are normal constituents of many foods, or of d-isoascorbic acid; it is not considered necessary to prescribe maximum limits for these substances.

Two Other Antioxidants

As regards other antioxidants, present and immediate future needs would appear to be satisfied by permitting also the addition of one general purpose antioxidant and one possessing good "carry-through" properties to fixed oils and fats (but not including butter) and to essential oils.

Propyl gallate and butylated hydroxyanisole possess the desired functional properties, and have been found by experience in other countries to be efficient and safe antioxidants. These two substances used singly or together would, in the view of the Sub-Committee, meet present requirements in Britain; at the same time, the position should be kept under review and the principle of allowing the use of mixtures of antioxidants would need to be further considered in the event of any extension in the number of permitted antioxidants.

Existing experimental evidence justifies the conclusion that no danger to the health of the consumer could arise from the addition to fixed oils and fats and to essential oils of propyl gallate and butylated hydroxyanisole, whether used singly or together, in amounts not exceeding 0·01 per cent. and 0·02 per cent. respectively, provided each substance is guaranteed to be of a satisfactory standard of purity.

If the foregoing proposals are accepted, it follows that no exception could be taken to compounded

foods, the ingredients of which include fixed oils or fats or volatile oils, containing any antioxidant introduced by the use of such ingredients.

The Sub-Committee accept the trade's representations that the food manufacturers should be informed both of the nature and amount of an antioxidant which may have been added to fixed oils and fats or to volatile oils supplied to him. The purchaser of such products sold by retail should also be informed when they contain added antioxidant, but in this case a quantitative statement is not necessary. Further, whenever practicable, the purchaser of compounded foods containing such products should be informed by labelling or other suitable means when an antioxidant is present.

No Case made out for Wraps

The use of wrapping materials containing an antioxidant may result in the food abstracting some of the antioxidant. There would, however, seem to be little purpose in the use of such wraps for edible oils or fats or for foods containing edible oils or fats which it is proposed should be permitted to contain added antioxidants, and no case has been made out which would justify their use.

It should be possible to produce satisfactory chemical evidence of the presence of antioxidants in foods, and enforcement difficulties need not be anticipated in this respect.

The trade's suggestion that criteria of harmlessness should be prescribed is a general issue affecting not only antioxidants but also the addition of any chemical substance to foods and as such is not commented upon by the Sub-Committee.

Recommendations

The following are the recommendations of the Sub-Committee:

(i) that the Public Health (Preservatives, etc., in Food) Regulations should be amended so as to deal with and authorise the addition of antioxidants to foods;

(ii) that antioxidants should not be added to any foods other than to edible oils and fats (but not including butter) and to essential oils;

(iii) that for the present, official approval should be restricted to the antioxidants propyl gallate and butylated hydroxyanisole, and that specifications as to the purity of these substances should be prescribed;

(iv) that either or both of the above named substances may be added to the foods specified in (ii) above, in quantities not exceeding:

	per cent.
Propyl gallate	0·01
Butylated hydroxyanisole ..	0·02

(v) that compounded foods should be permitted to contain that amount of antioxidant necessarily introduced by the use of an ingredient specified in (ii) above;

(vi) that provisions similar to those contained in the Public Health (Preservatives, etc., in Food) Regulations for articles sold as preservatives should be made to apply to substances sold as antioxidants;

(vii) that in general, the notification of the nature and amount of the permitted antioxidants present should be given to the purchaser of any of the foods specified in (ii) above, except that in the case of retail sales a quantitative declaration should not be required;

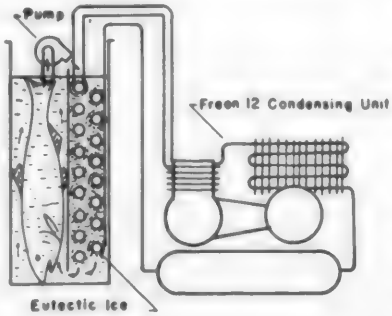
(viii) that nothing in the above recommendations should preclude the use in foods of tocopherols, lecithin, citric, tartaric, ascorbic, and d-isoascorbic acids, and the packaging of foods in inert gases such as nitrogen or carbon dioxide;

(ix) that review of the above recommendations should be made periodically under official direction.

Brine Freezing of Fish

THE aim of the investigation being conducted at the Pacific Fisheries Experimental Station by J. S. M. Harrison and S. W. Roach is to find a method of applying brine freezing to the freezing of fish at sea, suitable for conditions on the British Columbia coast with regard to species of fish, type of vessel, and the form in which the fish are marketed.

The work to date has been done with the apparatus illustrated in the accompanying figure. The brine used is an eutectic solution of sodium chloride (common salt), *i.e.* one containing 23·3 per cent. chloride by weight, which freezes at −6°F. to a homogeneous material (eutectic ice) without preliminary separation of either water ice (as from a weaker brine) or solid salt (as from a stronger brine).



Operational Techniques

The operating sequence consists of first cooling the brine to its freezing point, then freezing a considerable quantity of eutectic ice on to the evaporator. The fish is then immersed in the brine and frozen. The circulating pump operates throughout and maintains the brine temperature at −6°F. except for a few minutes when the fish is first introduced. There are several reasons for freezing brine on the coils. Firstly, it permits cooling the brine to its freezing point, whereas in conventional brine coolers some margin of safety must be left to avoid freezing and plugging the heat exchanger. Secondly, it provides a reserve of refrigeration which prevents the rise of brine temperature when the fish is first introduced and gives up heat at a rate exceeding the capacity of the small condensing unit. Thirdly, it allows the condensing unit to

Species	Salt content (% of total weight)			
	In skin	First ¼ in. under skin	Second ¼ in. under skin	Central portion
Spring salmon ..	1·29	0·15	0·15	0·15
Chum salmon ..	6·29	0·27	0·28	0·28
Grey cod	3·37	0·66	0·38	0·23

operate in periods of no load or part load, providing refrigeration in the form of eutectic ice, for future use.

Effect of Salt Penetration

Considerable work has been done to examine the extent of salt penetration into the fish in order to assess the seriousness of the detriment to brine freezing of the types of fish likely to be frozen on the British Columbia coast. Three possible adverse effects are: acquirement of too salty a taste, impairment of a glaze that may be applied after freezing, and promotion of rancidity. The table above shows typical analyses for salt in different species of fish.

The variation in skin salt content recorded is probably due to the fact that the fish were all rinsed in fresh water, immediately after freezing, to remove adhering brine. However, it can be seen that the salt content of even the first layer under the skin is well below the generally accepted level for palatability, which is usually taken at 1 per cent.

Glazes on brine-frozen fish which had been rinsed after freezing appeared to be as good as those on air-frozen control samples. This is being examined further in storage tests since it had been reported to be a most serious drawback to brine freezing of fish. Possibly this belief was a result of the high storage temperatures prevalent in the days when brine freezing was commercially tried in this area. Storage tests are now being carried out on brine-frozen samples in an effort to determine if there is any acceleration in the occurrence of rancidity.

Retarding Salt Penetration

Attempts are being made to find if freezing at close to the eutectic freezing point has an effect of reducing salt penetration beyond that reduction which can be accounted for by the speed of freezing. A theory has been offered that if fish is immersed in a brine, the brine being held at its freezing point, no salt penetration can occur, since the removal of salt from the brine would reduce its concentration and hence raise its freezing point which would in turn freeze the brine, stopping the action.

Freezing at the exact eutectic freezing point cannot be accomplished, but it may be that freezing in close proximity to the eutectic freezing point will retard salt penetration. Results of tests indicate that this is true but they are not as yet conclusive.

If brine freezing proves practicable it could provide a very compact and efficient freezing system for small craft. For example, a tank 16 by 30 by 36 inches operated by a 5 h.p. condensing unit could freeze 100 lb. of fish per hour. Little structural alteration would be needed and the condensing unit would require few automatic controls and would operate with a minimum of attention.

Chewing Gum

Gum was chewed by the Aztecs many centuries before the later inhabitants of Mexico adopted the habit and passed it on to the United States, who in turn popularised it in European countries during the First World War. Only in America, however, can the manufacture of chewing gum be considered an industry of the first magnitude.

This industry is dependent upon the coagulated latex of the sapota tree, commonly known as chicle; no other material has that attractive combination of qualities which have made the chewing habit so popular. History has it that a Mexican exile, who had gone to live at Staten Island during one of the numerous Mexican civil wars, brought a large stock of chicle with him for consolation, part of which he left behind on his return home. It was found by one Adams who first tried (in vain) to vulcanise it, taking it for a form of rubber. Recalling that the Mexican had never ceased to chew in his presence, Adams hazarded a trial chew; this impressed him favourably. That was how the first American chewing gum firm — Adams and Sons — came into being.

In 1871, Adams took out his first patent for a chicle-working machine, at the same time incorporating sugar and flavours in his product; hitherto the gum had been marketed in its natural state. Adams' chewing gum continued to increase in popularity, other firms cashed in, and the year 1899 saw the introduction by Wrigley of the peppermint-flavoured gum.

In the course of the succeeding years, chicle became a monopoly of the American chewing gum industry, so that makers in other countries have cast around for substitutes with the appropriate combination of properties. Among the materials tested have been gum pontianak, gum jelutong, gutta-percha, and balata. However, most research has been devoted to the modification of crude rubber by means of resins, oils, waxes, fats, etc. The synthetic resin, polyvinyl acetate, is now actually used for this purpose.

The nutritive value of chewing gum is *nil*, the value of sugar and other extraneous ingredients being purely incidental. People chew because it calms the nerves, and aids digestion through the increased secretion of gastric juices.

The usual forms of chewing gum are strips (the most popular in the U.S.) and balls. For the balls the procedure is to cover a central core with a thin layer of sugar syrup (as in the enrobing of *dragées*) which is left to dry before application of a further coating; the operation is repeated until a sufficient thickness has been built up.

Pressure Cooking and Cooling

Part II

L. C. Davis

In the second and last instalment of this series, the author discusses the labour saving and other advantages inherent in the use of high speed processing lines. Other angles discussed are the different implications of can cooling and the handling of vacuum closing and syruping machines.

ONE of the most important points in favour of high speed processing lines in these days of high costs of cannery labour, is the resultant labour saving in man hours, since these units are almost completely automatically controlled.

One man can supervise several continuous lines, and can, in fact, adjust temperature ranges between 212°F. and 260°F., in a matter of minutes, by simple operation of the controlling instruments. This point, together with the fact that the machines are equipped with variable speed drive units, lends itself to almost infinite combinations of cooking times and temperatures. Summing up, the advantages are as follows:

1. The agitation imparted to the can in continuous equipment permits rapid heat penetration, thus materially reducing processing time.
2. It makes possible the use of high temperatures without the danger of scorching or discolouring a portion of the contents of the can.
3. It produces a better quality product from the standpoint of colour, flavour, and nutritional value.
4. It shows a distinct steam consumption saving in terms of pounds of steam per can.
5. It conserves cannery space by reducing cook room areas in terms of cans or cases per minute.
6. It shows labour saving in man hours due to the nature of its automatic function.
7. This point is not entirely confined to continuous pressure cookers, but applies to high speed lines over slower lines, inasmuch as it takes one man to attend to a closing machine operating at 60, as well as one operating at 200 cans per minute. This point also applies to the operation of the vacuum syruper.

Can Cooling Rates

From the brief discussion of factors affecting the rate of heat transfer, it can readily be seen that for any given product in the same size can and with approximately the same conditions of fill, the rate of cooling is dependent upon the degree of agitation and the temperature difference between the product and the cooling medium. For any given degree of agitation, the most rapid cooling would occur at the greatest possible temperature differential. Such a condition would require constant temperature of cooling medium. For a given condition of temperature differential, the rate of cooling will be increased with increased agitation until it approaches its limit of "perfect" convection.

Cooling Water Requirements

How much cooling water should be used? This is a question frequently asked. In the transfer of heat from one material to another, a heat balance must be reached which can be expressed by the equation

$$\text{Mass cans} \times \text{specific heat} \times \text{temp. drop in cans} = \text{Mass water} \times \text{temp. rise in water.}$$

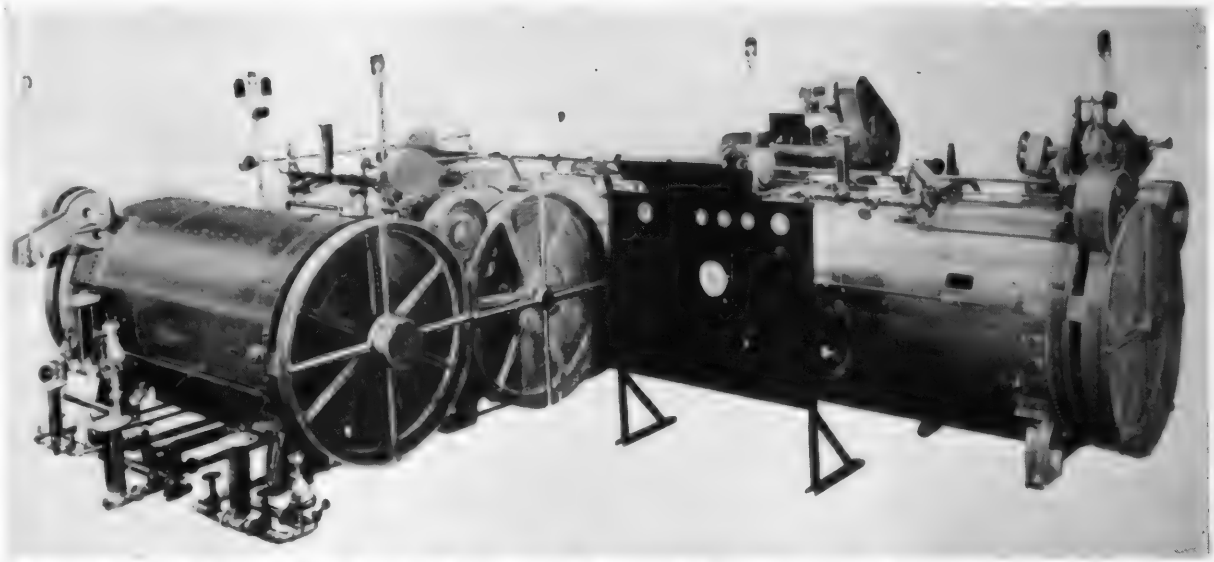
This equation indicates that an infinite amount of water would be required to maintain the cooling medium at a constant temperature. A condition, therefore, where a slight rise in cooling medium is obtained by the use of a finite amount of cooling medium, will give practically the same results as a constant temperature. It also indicates that for conditions of identical product, can size, and agitations, as less cooling medium is used, so must the temperature of the cooling medium increase; therefore, the differential between the product being cooled and the cooling medium is decreased. Since this differential is the factor controlling the rate of cooling, the time to cool the cans to any given temperature is increased.

To arrive at the quantity of cooling water to be used, there must be taken into account the availability of cooling water compared to the volume of cans to be cooled and the length of time available for cooling. In the final analysis, this is a question of cost or availability of water *versus* cost of equipment in the case of continuous coolers, or cost of water *versus* production in the case of batch cooling.

In a continuous cooler, conditions exist whereby cooling water and cans enter and leave at opposite ends of the equipment, thus setting up a counter-current condition. In this case, the cooling time is dependent upon the rise in temperature of the cooling medium. The greater the rise, the slower is the time. Ideal conditions for canned fruits and vegetables appear to be those in which a sufficient quantity of water is run through the cooler in order to keep the can outlet end at the temperature of the cooling water, while obtaining a can temperature of approximately 100°F. At the same time, water leaving the can inlet end of the cooler should have increased in temperature at least 25°F. or more. It is possible to calculate, from experimental data, equipment requirements to give such conditions; however, any change in conditions, such as a change of product, can size, cans per minute, or cooling water temperature, will affect the final results.

Spoilage during Cooling

Spoilage due to cooling operations can occur only if the cans leak, if the cooler is contaminated with spoilage organisms, and if the pressure in the cooler exceeds the internal can pressure. These are all relative factors. Large can leaks, heavy cooler contamination, and high pressure differential, favour increased spoilage.



A standard three-shell pressure cooker with split-cool. This unit consists of one cooker, a short pressure cooler, and an atmospheric cooler. It is designed primarily for products which require cooking at high temperatures.

Photo Food Machinery and Chemical Corporation.

Usually spoilage from leaky cans is exceedingly variable.

Improperly formed can seams may result in serious leakage; but mechanical damage to seams, particularly if the can is hot, may cause leakage in otherwise sound cans.

The most serious forms of seam damage, namely hard blows on sharp edges on the seam where it crosses the side seam and from one can seam striking another just below its end seam at the side seam, generally cannot occur within either continuous pressure cooker, cooler, or properly timed transfer valves.

Excess of external pressure over internal pressure always will occur some time during complete water cooling.

It is commonly thought that leakage through a seam is most likely to occur when the end flips in. Experimental work has shown that because of the diaphragm action of the can ends, "flip-in" of the ends of open top cans always occurs when the internal pressure exceeds the external pressure. Since leakage cannot occur in the direction from lower to higher pressure, leakage and recontamination cannot occur at the "flip-in" point.

If cooling water were sterile, no spoilage would result even if cooling water entered the can through defective seams due to a high pressure difference. Cooling water is not commonly sterile, but vast differences in cooler contamination exist commercially. The water in continuous pressure coolers is somewhat static, and some of it is at a temperature favourable for bacterial growth. Contamination of the can contents increases in direct proportion to the concentration of organisms in the cooler water. For example, if it is assumed that one organism entering the can is able to cause spoilage, Table III shows the spoilage expectancy if each can leaks 1/10,000 ml.

TABLE III

No. organisms per ml. cooling water	*Spoilage in cans per minute resulting from leakage of 1/10,000 ml. of cooler water per can*
1	·1
100	10·0
1,000	100·0

Under actual conditions, most cans do not leak at all. Others may have leaks so small that the organisms are strained out. In any case it is highly desirable to minimise cooler contamination. Pressure coolers may be sterilised daily by draining out the water and heating them at 250°F. with steam for 15 minutes. The bacterial count in open or pressure coolers may be minimised by chlorination. Excess chlorine (above 5 p.p.m.) should be avoided, as it is corrosive.

It is particularly important to note that spoilage, due to contaminated cooling water, may be caused by rough handling of cans subsequent to pressure cooling. During cooling, some water gets under the seam and in contact with the outside edge of the seam compound. When cooling has been sufficient to reduce the internal pressure of the can to less than atmospheric, and if the water under the seam is not removed by drying, damage to the seam may cause a leak which will pull in the contaminated water and cause spoilage.

Spoilage will not necessarily result even when imperfect cans are cooled, under an external pressure higher than internal, in contaminated water. Most of the organisms in contaminated cooling water are usually of very low heat resistance. If water cooling is terminated with average can temperature at 160°F., the subsequent air cooling may be slow enough for the residual heat to destroy the low resistant organisms, thus re-sterilising the container.

For example, experimental studies in the U.S.A. showed that cans with faulty laps were used in one test where the cooling water was highly contaminated. When

the cans were cooled to 100°—110°F., spoilage resulted in all cans having bad laps, whereas none occurred in normal cans. When the cans were cooled to 160°—170°F., no spoilage occurred—even in cans with open laps.

However, cooling to temperatures in excess of 100°F. should be avoided because of the possibility of spoilage from thermophilic organisms not destroyed during processing.

Vacuum Closers and Syrupers

Vacuum closing machines should be of the fully automatic type to deal with cans at the rate suitable for pressure cookers. It is necessary to use a clincher which loosely clinches the lids without forming a complete air-tight seal.

From the clincher, the cans are transferred to the valve of the vacuum closer into the vacuum chamber where they are momentarily subjected to a vacuum pull, sealed, and finally ejected through a further air-tight valve. As this procedure is of very short duration, it follows that its main function is to withdraw air mainly from the headspace and only partially from the product in the can. For this reason, when being used in the processing of syrup packed fruits, the condition may arise where "flashing" of the liquid contents from the can occurs; this is particularly so when there is an appreciable amount of dissolved air either in the product or entrapped in the void spaces of the can. Liquid is carried with the air escaping quickly from the can.

Hence the prior use of a suitable vacuum syruping unit, the prime function of which is firstly to draw the air surrounding the product, and according to the vacuum range employed, from the actual product itself, then while still under vacuum, syrup is added to the can to a predetermined level. The level of the syrup is governed by displacement plugs in the syruper valves, and these can be adjusted to give a predetermined gross headspace in the can. Headspace is of paramount importance to the efficient functioning of both the vacuum syruper and closing machines.

Necessity for Clincher

In the instance of syrup packed fruits, vacuum closers are not always favoured, as it is necessary to include an extra piece of equipment in the form of a suitable clincher, resulting in additional capital cost. However, with meat packs and similar commodities which heat up very slowly, this form of closing gives better results than are obtained by the use of thermal exhaust boxes, as it is impossible to obtain sufficiently efficient vacuum with these.

For canners who process meat packs as well as fruits, vacuum closers and clinchers can be employed with vacuum syrupers on fruits, and later transferred in the off season to meat production. Thus they can be used for the major portion of each year.

Ranges of vacua drawn on the vacuum closer can be widely varied to suit the canned product, and also, in the case of canned fruit, to accommodate the temperature of the syrup content.

Advantages of vacuum closing over thermal exhaust methods are the more sanitary handling of cans, possibly less spillage, saving in floor space, and distinct saving in steam plant requirements.

Steam Flow Closers

Steam flow closing machines are generally high speed conventional closer equipment with attachments to inject live steam into the headspace in the can at the time of closing. When this is properly employed, it will replace all the air with live steam which condenses and forms a vacuum, provided the can is immediately fully seamed. The introduction of a flow of steam into and about the open can is generally accomplished by a series of steam jets that have been installed in the turret assembly and also in the seaming head. This steam application is generally prevalent during can and cover assembly, and most times throughout the first seaming operation so that condensed steam will not be replaced by air or gas.

As in the case of vacuum closing, it is advisable to employ prevacuumising to the canned product before closing, in order to remove occluded air from the product or the cavities formed by the packing of same in the can.

Steam Requirements

It is recommended that steam as dry as possible be used in the steam flow unit. Earlier models of American steam flow closers incorporated a long steam tunnel so that the product was subjected to some prior heating, particularly in the headspace area, prior to the actual steam flow procedure. However, by more efficient design of steam ports in the can and cover assembly turret, and in some instances, by the almost complete enclosure of the can while the double seaming operations are taking place, this is not now considered necessary.

It has been said that steam flow closing does not offer any material advantage for products using a heated brine fill and no exhaust, such as green beans, or for preheated products which are filled and closed hot. The same material advantages of steam flow closers *versus* exhaust boxes prevail as in the case of vacuum closers.

Much has been said and written with regard to the influence of headspace in the can in relation to good final vacuum results, and this is correct. No matter how efficient the vacuum syruper may be, the final result of can vacuum depends firstly on headspace in the can, and almost as important on the efficient functioning of the steam flow unit.

FUTURE ARTICLES

AMONG the articles to be published in forthcoming issues of FOOD MANUFACTURE are "The Bacteriology of Meat"; "Quality Control in Ice Cream Manufacture," by P. S. Lucas and Roger Wilkowske; "The Psychology of Appetite"; "The World Food Problem"; "Lactic Acid Bacteria in the Meat Industry"; and "Measuring Temperature by Electronics," by Jack Meyer and Leo Walter.

The Food and Agriculture Groups in Belgium

W. Leonard Hill

The high standard of organisation which has become a byword in the history of the annual Food and Agriculture Group tours was fully maintained in the 1953 visit to Belgium from May 23 to 30. Into the span of seven days was fitted a full programme of visits to laboratories, factories, and Research Institutes.

THE journey to Brussels completed, *via* Dover and Ostend, members had the opportunity of seeing something of the Belgian countryside before settling down to the more serious business of the tour. On Sunday, May 24, they enjoyed an all-day motor coach excursion to Les Grottes de Han, the Ardennes, Dinant, and the Meuse Valley, with luncheon at the Hotel des Ardennes.

The first official visit of the tour took place on Monday morning, when members went by coach to Wezembeek-Ophem, the home of the *Institut National pour l'Amelioration de Conserves de Légumes*, and were conducted round the premises by the Director, Dr. L. De Faestraets. This is a relatively new concern which corresponds in its organisation and functions to the British research associations. Its task is to study methods of improving vegetable crops and their subsequent preservation. Equipped with pilot scale canning plant, the Institute has laboratory facilities both for research and for service to its members.

Food Standards and Brewing

After luncheon, the party was shown round the laboratories of the *Ministère des Affaires Économiques et des Classes Moyennes* by Dr. A. R. Deschreider. In this building is housed a remarkable organisation devoted not only to economics but also, in the laboratories, to the testing of food, textiles, and metals to ensure compliance with the standards of the department. The wide range and modernity of the scientific equipment in use were the objects of admiration by the party.

On Tuesday, the party divided into two, the first being received by Vicomte de Spaelberck and M. van Roey on their visit to the *Brasseries Artois* at Louvain where brewing operations were seen. If sulphuric acid consumption be one index of industrial activity, the beer consumption is perhaps another, and, on the latter basis at least, Belgium is a highly industrialised country.

Belgium enjoys the best of both worlds, for she has been a big brewer of top fermentation beer, and is still a substantial consumer. Although the Artois Brewery was firstly a top fermentation brewery, a process which is still followed on one of its plants, the major production is now by bottom fermentation. The party was able to inspect a modern lager plant and sample its products together with a bottled beer known as "Prof" produced by top fermentation.

Asparagus Canning

Following luncheon, to which members of the party were entertained by their hosts, a visit was made to the vegetable canning factory of *Usines Le Soleil* at Malines. A welcome was extended to the party by M. J. Wittouck, managing director, and M. L. E. Bégault and M. J. A. Bégault assisted in conducting members round the cannery. The visit coincided with a period of intensive canning of asparagus. As it was necessary to deal quickly and efficiently with the whole of the crop during a comparatively short period, a double shift had been instituted to cope with the field deliveries which arrived at the factory at short intervals.

The outstanding characteristic of Belgian asparagus which struck the British visitors was the fact that all the tips were white. Apparently Belgians do not like green tips, and when these are present the asparagus is reserved for export to Britain, among other countries. Asparagus is grown underground, and it is picked the moment a crack appears in the soil to prevent any formation of chlorophyll by the action of the sun.

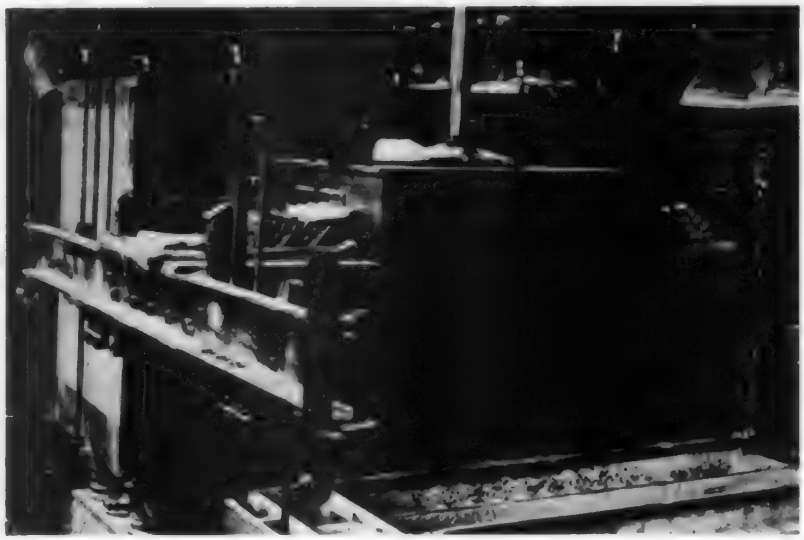
On arrival at the factory, the asparagus is cleaned and blanched. It is then sorted into sizes depending upon the length and thickness of the stems. It is at this stage that those showing green or pink colorations are segregated. Subsequently the vegetable is blanched in hot dilute brine. In the case of asparagus with thick lower stems, the thick portion was given an additional heat treatment in the blanching vessel to counterbalance the additional heat which would otherwise be required during the actual processing.

The packing, filling, and seaming of the cans followed the usual procedure, after which processing was carried out in steam retorts. The general hygiene for a factory of this type was noteworthy, every care being taken to ensure it.

Labour saving devices are employed whenever possible, one machine packing filled cans into a carton, which was subsequently gummed on the flaps, closed and sealed. The company manufactures its own cans from tinplate sheets, the plate being lacquered when necessary. About 50 million cans are manufactured per year on the latest types of can making machinery.

Pea Canning

During the pea season, which lasts about eight weeks, the factory works round the clock. Every operation is mechanised as far as possible, and the general layout of plant follows the latest American practice. The peas are passed through brine separators, and finally processed in large continuous cooker-cooler retorts. The importance of using chlorinated



A plansifter at the Hungaria Mills dismantled for cleaning.

water for cooling was emphasised. Processed peas are not canned in Belgium, there being no market for this product. In addition to peas, string beans, celery, carrots, spinach, mushrooms, soups, and tomato purée are canned.

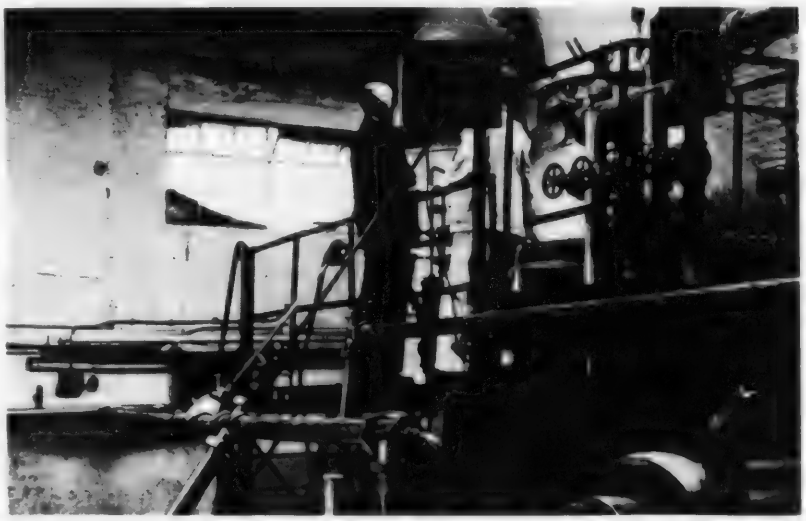
The party was entertained in a building, still to be completed, which will house a showroom for the display of the firm's products and a large assembly room which will be available for the social activities of the employees.

Flour Milling

In the meantime, the second party was welcomed at the *Moulins Hungaria* at Louvain by M. Peters and M. Everard. After suffering many misfortunes during the war, the mill is now one of the finest industrial buildings in the city. In the seven-floor building, elevator heads occupy the top floor, Duo-Aspirators and detachers the sixth, two sifting floors the fifth and fourth, and two purifier floors the third and second. The roller mills are on the first floor, three lines of rolls being disposed on each side of a central line of elevators. The ground floor accommodates line shafts and conveyors. A new provender mill is now under construction.

Milk Canning

After leaving the mill, the party proceeded to the milk factory of



Prof. H. D. Kay inspects the evaporator at the canned milk factory of Libby McNeil and Libby S.A.

Some members of the tour at the Lacsoons dairy plant.

the Compagnie Libby McNeil et Libby S.A. where they were entertained to luncheon by the company and the *Office du Lait*. At the luncheon, Mr. C. R. Higby spoke of the difficulties faced by the company in repairing the damage caused during the war and amused his listeners by telling of the horror evinced by the Belgian nurse when sterilised, bottled milk was fed direct to his children. "It must be boiled," she declared, "or the children will die!" She still remains unconvinced, despite many lengthy explanations of the process of sterilisation. In this

milk cannery, with its high speed canning plant, are also situated fruit juice concentration and jam-making plants, not in operation at the time of the visit.

Prof. P. Siomart, who also spoke, extended an invitation to visit the laboratories of the Agricultural College of the University of Louvain. This was in addition to the planned schedule, and all too little time was available for anything but a very brief impression of the work in the microbiology and dairy bacteriology departments.

A Modern Dairy Plant

The next visit was to the modern dairy plant of the *Compagnie des Produits Lacsoons S.A.* at Rotselaar-lez-Louvain. Here four automatic washers are installed to deal with the cans on arrival, each bearing a number relating to the farmer from whom they are received; farmers are paid on butterfat content. In addition to the pasteurising and sterilising of milk, the company is also concerned with the production of yoghourt, butter, and cream. Two other items of interest were the bottling of chocolate flavoured milk and of a product consisting of a mixture of milk and flour which is a traditional peasant food.

Food Research and Technology

The whole of Wednesday morning was taken up with a visit to the *Centre d'Enseignement et de Recherches pour les Industries Alimentaires* which, as its name implies, engages in both research and practical training and teaching. The party was received by Prof. Ketelbant, who outlined the present work on the decolorisation of palm oil, and Prof. Waime, who conducted the party round the Institute, spoke of the work being carried out on amino acids. During the course of this visit, the party toured the new establishment at Anderlecht, the residential quarter of which is nearing completion. When complete, it will house a teaching and research centre devoted to food technology.

Following luncheon as guests of the Institute, the party visited the *Institut Agronomique de l'État* at Gembloux, which is justly proud of its new buildings and of the wide range of work conducted in them under the two main divisions of chemistry and agricultural physics. Work in progress included cattle fattening experiments and the use of antibiotics. In the model dairy, research is being carried out on the keeping qualities of butter made from fresh and from sour cream; ferments for silage are also prepared here. During the visit, Prof. Willens spoke of his work on the use of antimalarial drugs in the fight against foot-and-mouth disease.

There is also a plant breeding station at Gembloux at which work on flax, small grains, peas, and tobacco is carried out.

Milk tankers at the Lacsoons dairy plant.

Social Activities

On their return to Brussels, the party were entertained at a cocktail party as the guests of the *Fédération des Industries Chimiques de Belgique* in conjunction with the *Société Chimique de Belgique*, and the *Vlaamsche Chemische Vereening*. Members were received by the director and the two presidents, M. F. B. Guilmot, Dr. Delange, and Dr. Stevens. Many were the introductions between visiting chemists, industrialists, and their hosts at this pleasant function.

Thursday morning was the time of the official reception and Vin-d'Honneur by the Burgomaster of Brussels, M. le Docteur J. van de Meulebroeck, who has just been made a Baron.

Sugar Refining

In the afternoon, the party again divided into two, the first visiting the *Raffineries Tirlemontoises* at Tirlemont—the sugar refinery which produces all Belgium's sugar. After thorough washing with water the beets are flumed into the factory for the sugar extraction. The particular method of extraction employed here is the subject of a patent held by the company. The plant covered by the patent consists of a large cylinder into one end of which the beet enters while the sugar is extracted by water flowing in the opposite direction. The success of this particular counter-current method of extraction can be gauged by the fact that six units have been ordered for operation by sugar manufacturers in Britain. The engineering resources of the company are sufficiently extensive to deal with these outside demands.

The period of the visit did not coincide with the beet season, the factory being engaged in the manufacture of sugar—in cube and granulated form—from imported beet. The refinery processes follow the normal pattern, *i.e.* clarification with lime, decolorisation with charcoal, concentration, crystallisation, separ-

Chain ovens at the bakery of the *Maison du Peuple*.

ation, and finally grading and packing.

With so large an output, each stage of the process necessitated a battery of machines, and the entire layout emphasised the magnitude of the operations carried out.

Considerable interest was shown by the visitors in the sugar cutting and wrapping department. It is in this department that the sugar crystals, after being centrifuged and dried, appear in the form of slabs which are cut into size and wrapped.

Milk Collection and Processing

The second group participated in three visits; first to the *Office National du Lait* for a talk on Belgian milk production, then to Essen, near Antwerp, to visit the *Zuivelfabriek de Eendracht S.M.*, the collection station for so-called labilised milk, and finally to the *Melkinrichting Moderna* dairy at Antwerp. The collecting depot is a semi-co-operative unit, which receives, cools, and standardises to 3 per cent. fat, the milk from some 400 small farms. About half these farmers produce milk from tuberculin-tested cows that are also free from contagious abortion and under veterinary supervision—milk similar in quality to the best raw milk in the United Kingdom. The cooled, standardised milk is sent by road tanker to the Moderna dairy, the whole process being encouraged and supervised by the *Office du Lait*. This endeavour, now being taken up by other of the big towns, is to establish a supply of milk of highest pre-pasteurisation quality, pasteurise it by the most up-to-date modern methods, under careful control, and thus provide the town consumer with a first-class, safe, standard article that can be relied on throughout the year. The retail price is some 15 per cent. higher than that of ordinary pasteurised milk.

Milk Treatment

Under the guidance of Dr. K. L. Devriendt of the *Office du Lait*, the party was conducted round the Moderna dairy. Of medium size, it is equipped with a Danish H.T.S.T. plate pasteuriser. An interesting feature of this plant is that after plate pasteurisation at 71° to 72°C. for 15 seconds, the milk is given an extra "blitz" of 1 to 1½ seconds, in a Stassano type attachment to the H.T.S.T. plant, and then rapidly cooled. This is said to give a higher keeping quality, but certainly destroys the cream line.

A Co-operative Bakery

On Friday the party again divided, and a welcome was extended to the visitors to the *Maison du Peuple*, the co-operative bakery in Brussels, by the general manager, M. A. Huyssens, M. A. Chamonier acting as interpreter. The visit included the showing of a documentary film of the bakery at work, inspection of the laboratory, and of the bakery, which was opened in 1928 and is being brought up to date by the installation of modern equipment. At the Liberation, this organisation was chosen to help feed the British Army, and performed the remarkable feat of producing 1,000 loaves in one day.

Plant Research

During the afternoon the party visited the agricultural station of the *Union Chimique Belge* at La Hulpe, one of the high spots of the tour. In attractive surroundings, all branches of plant production are carried on, ranging from farm to ornamental culture.

Monsieur and Madame Ernest Solvay entertained members at the *Chateau de la Hulpe*.

There followed a pleasant interlude, when the party attended a reception at the invitation of Monsieur and Madame Ernest Solvay, at their beautiful home, the *Chateau de la Hulpe*. Just before arrival, a light shower of rain had fallen, and the fragrance of the roses covering the walls of the terrace will long remain a memory of that afternoon.

Biscuits and Chocolate

In the morning of this last day, the rest of the party visited the confectionery, biscuit, and chocolate factory of de Beukelaer at Antwerp, who claim to be the first company to manufacture biscuits on the continent, the art having been learned from Britain. The company produces a wide range of attractive products in an efficient and hygienic manner. The plant is modern, and much of it—notably the gas-fired travelling ovens—is of British manufacture.

This section of the Group joined the others at La Hulpe for the reception at the *Chateau*.

The Farewell Dinner

At the conclusion of the tour the party gave a farewell dinner at the *Rôtisserie de la Reine Pédauque* to the many friends who had so warmly welcomed them during the week. Prof. H. D. Kay, the chairman of the Food Group, proposed the toast to pure and applied chemistry in Belgium, which was acknowledged by M. Ernest Solvay. Mr. W. Leonard Hill, chairman of the Agriculture Group, replied to the toast of the Food and Agriculture Groups given by Prof J. Timmermans.

So ended a full week of tours and social events, the success of which was ensured by the hard work of the organising secretary of the tour, Dr. B. V. de G. Walden, and the members of the organising committee.

Those taking part in the tour were: Miss P. M. Agate; Dr. and Mrs. A. J. Amos; Mr. and Mrs. J. Andrews; Mr. R. C. Baker; Mr. A. P. Buchanan; Mr. H. J. Bunker; Mr. C. W. Chater; Mr. R.

(*Concluded at foot of next column*)

de Giacomi; Mr. W. Leonard Hill; Prof. H. D. Kay; Mr. R. D. Mason; Mr. and Mrs. R. H. Morgan; Dr. and Mrs. J. D. Mounfield; Mr. R. J. Munro; Mr. D. J. Munro; Dr. and Mrs. J. H. Oliver; Mrs. M. T. Travers; Dr. B. V. de G. Walden; Mr. and Mrs. J. B. Wilton; Mr. and Mrs. C. E. Wiseman; Dr. C. G. M. de Worms.

Correspondence

To the Editor,
FOOD MANUFACTURE

The Bakery Technologist

DEAR SIR,—For many years now, full-time day students who have completed the National Diploma Course at the Borough Polytechnic have been recommended to employers requiring trained employees. Not one student who has gained his National Diploma in bakery subjects has had much difficulty in getting a suitable post. The problem has been in the reverse direction; enormous numbers of employers have notified us of vacancies which we cannot fill. It deserves to be more generally known that the demand in the greater London area for students who have completed a full time National Diploma Course far exceeds supply. Trained bakery students are at a premium.

During the past few months a further problem has arisen. There have been requests from at least a dozen large bakery, milling, and allied firms that are seeking trained bakery technologists, *i.e.* former students who have completed the Higher National Diploma Course. Some of these firms are prepared to pay salaries from £750 to £1,000 per annum. Here again we could not supply the demand since those former students who have taken the Higher Diploma Course are settled in responsible positions.

Both the Diploma Course in bakery subjects and the Higher Diploma Course deserve far more publicity than they have received, and might well be discussed at bakery association meetings.

The new building at the Borough Polytechnic, which has cost approximately £250,000, has been designed not only to carry on the traditional part-time and full-time training of bakery students at the National Bakery School, but also to train people for the newer posts in Higher Technology. The facilities available are unique and make the new bakery school a training and technological centre of which the whole industry should be proud.

Besides being able to train up to 45 new students per year for the National Diploma, there are facilities for training up to 15 senior students per year for the Higher Diploma. It is hoped that bakery and allied associations as well as individual firms will point out to prospective students these opportunities of bakery education and the wide choice of careers in the cereal industries.

It is a tribute to the Higher Diploma Course that several firms use it for their own trainees. This is advantageous to those firms, but has one effect which should not go unnoticed, namely that the number of Higher National Diploma students on the "free market" is thereby reduced. Firms that are likely to require bakery technologists in the next few years are therefore well advised to co-operate with one another now and to give all possible encouragement to suitable young men and women to take the Higher Diploma Course.

There are still people who profess to ignore the changes that have taken place and which are taking place in the baking industry, and who in letters and articles in the trade press reject the idea of a higher technological training. An answer can be given to such critics by giving an example of the training scheme of one well-known bakery company which five years ago decided to use the Borough Polytechnic as a base for its training programme. Over the period 12 men, all university graduates with high qualifications, have come to the National Bakery School for a two year full-time course in bakery subjects. They

have all been eminently successful in both the crafts as well as in the science of bakery. They have received no special privileges, and have won some of the prizes in confectionery as well as in theoretical work. After a period of industrial experience, they are now serving as production and assistant production managers or hold other executive positions in different branches of this firm. One is now a Director of one of its subsidiary firms. This firm is now reaping the benefit of the money it has spent in training technologists for its executive posts.

As one who has spent the past 28 years in training craftsmen for the baking industry, I firmly believe that the craftsman has an important place in the industry, and that anyone who completes the National Diploma Courses can achieve real success as the owner of a family business, or as an executive of a larger concern. There are hundreds of our former students all over the country who are now successfully managing their own bakery business or are Directors of larger bakeries.

We must recognise also, and in all honesty inform prospective students, that there is a definite and growing demand for men with other talents whose services are required to meet the modern needs of the industry.

Yours faithfully,

J. STEWART,

National Bakery School

Department of Food Technology.

London.

To the Editor,

FOOD MANUFACTURE

Food Infestation Control

DEAR SIR,—We are particularly interested in your report on the Joint Meeting of the Royal Sanitary Institute and the Food Group of the Society of Chemical Industry, and the new developments in food infestation control, particularly the paper by J. W. Evans, M.A., Sc.D., D. Sc. (Chief Scientist, Infestation Control Division, Ministry of Agriculture and Fisheries).

As millers, we take a great deal of interest in this, not only the prevention of rodents on the farm, but also in providing a filler base for Warfarin feeding.

Regarding the difficulty of finding baits for administering Warfarin, in actual fact lipase enzyme free oatmeal, as manufactured by our company, is attractive to rodents even when it is in competition with oatmeal stored round them, principally because it is laid out in an easy way for feeding. The lipase free oatmeal does not turn rancid when stored for long periods in automatic feeders, even in damp atmospheres; furthermore, it still remains attractive to rats. The oatmeal itself is very high in vitamins of the B group, and no doubt this accounts for its popularity with rodents, especially as it maintains its quality for very long periods.

Yours faithfully,

PHILIP LEA,

Director of Morning Foods, Ltd.

Crewe.

Insects as Food

THOSE whose curiosity, if not appetite, was whetted by Dr. W. S. Bristowe's paper read at a recent conference of the Nutrition Society (FOOD MANUFACTURE, **27**, 12, 491) on insects as food, will appreciate a book* which must leave little to be added to the subject.

The answer to the puzzle which baffled many physiologists when they noted that the diet of some tropical races, obviously fit and adequately fed, was deficient in protein and fats, was that the constant eating of termites, caterpillars, locusts, and similar creatures compensated for this deficiency.

Authoritative accounts of insect eating habits, collected by the author from widely scattered journals and books on travel, ethnology, geography, medicine, and zoology, are presented in an attractive style. The history of entomophagy from antiquity to the present day is contained in an early chapter. Discussing the aversion to insect food in western civilisation, the author declares that it is not based on hereditary instinct, but is established by custom and prejudice. Greek literature contains a number of references to the eating of cicadas, which were regarded as delicacies; the eating of lice was almost cosmopolitan, and locusts and grasshoppers were commonly used as food.

The author has delved into the literature from the date of the appearance of the compendious folio volume *De Animalibus Insectis Libri Septem* (1602) to the present day, and in passing, has made mention of a curious booklet by V. M. Holt published in London in 1885 entitled "Why Not Eat Insects?" with the motto: "The insects eat up every blessed green thing that do grow and us farmers starve. Well, eat them and grow fat!"

Following those concerned with the historical angle come chapters classified according to different countries, among which figures Australia (in which entomophagy is common) even though the aborigines have become "civilised."

In their turn, the insect eating habits of the inhabitants of Africa, Asia, and the Americas are described in detail. The tables of analysis should convince the sceptic of the nutritive virtues of a large number of creeping things. Finally, there are 20 pages of bibliography, and a number of illustrations.

To those not necessarily in search of new systems of diet but interested in curious facts, this book can be recommended.

* *Insects as Human Food.* By F. S. Bodenheimer. Pp. 352. W. Junk, The Hague. Price Dutch guilders 10.

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of articles on the subjects covered. Books on food would also be considered.

Education in Nutrition

The vital role of food in sustaining all forms of human activity makes it highly important that the science of nutrition should be more widely understood. In Britain we can claim to have kept abreast with world progress in research on nutrition, but in its organised teaching we have perhaps lagged behind other countries. A recent conference of the Nutrition Society, held at Queen Elizabeth College, London, with Prof. John Yudkin as chairman, therefore fulfilled a useful purpose in reviewing the forms of education in nutrition which are at present available in this country.

MOST people in this country eat four meals each day, farmers, food manufacturers, butchers, bakers, and many others earning their living by supplying the necessary food. In this scientific age it seems only reasonable that knowledge of food values, and of the body's requirement for food, should be very widely known. In a free country we cannot be compelled to eat what is good for us, but we should at least not be malnourished through lack of good advice. Thus, it seems necessary to ensure that teachers with a sound knowledge of nutrition should be available, from university standards downwards, and that channels should be provided for the communication of that knowledge to our population at large.

Education in Schools

Miss E. M. Hale pointed out how in schools the most intelligent children receive the least instruction directly relating to nutrition. At the elementary stage girls are taught a little about food values and the planning of adequate meals in the housecraft room, but boys only get what information they can in lessons on science, gardening, or nature study.

After the grading examinations at 11 years, girls sent to modern schools are taught how to plan and make a simple meal, and how to choose foods for the family. More intelligent girls who are sent to grammar schools, however, have to concentrate on the pure sciences, and have little time for housecraft. Even if they intend to take up this subject as a career they usually have to abandon it at school to make room for adequate instruction in science.

In England and Wales there are about 20 Domestic Science colleges, and Mrs. E. B. House spoke about the education in nutrition of the housecraft teachers who emerge from them. As the result of their training they should know enough about nutrition, and how to teach it, to ensure that girls when 15 to 16 years old know all about food values, and how to apply them in preparing good meals.

The teacher might find bad habits hard to change. She must be able to make both a practical approach to her problem, and a scientific one based on chemistry, physiology, and bacteriology; also a psychological approach, including the influence of correct feeding on the figure and personal appearance. She must know about legislation relating to food, and be aware of the social background of the girls she is teaching.

Medical Students

The place of nutrition in the medical curriculum was discussed by Prof. S. J. Cowell who, at University College Hospital, occupies the one Chair in England which was endowed solely for the study and teaching of dietetics. The instruction given must ensure that every doctor should know the requirements of food both in health and disease. Thus he must know what foods are necessary for good growth in youth and sound health in age, and at the same time be able to advise on problems such as the treatment of obesity. He must realise that a bad diet in hospital may delay the progress of healing.

With so much already to be learnt by the medical student, Prof. Cowell questioned the wisdom of increasing the burden by adding nutrition as a special subject. It would be easier, and also more effective, to emphasise the references to nutrition during the teaching of other subjects. Thus the Professor of Surgery should hold himself responsible for familiarising all the students taking this course with the influence of diet on the healing of wounds.

The New University Degree

Miss A. M. Copping outlined the course leading to the London University B.Sc. Degree in Nutrition which is to start next October at Queen Elizabeth College (FOOD MANUFACTURE, **27**, 11, 430). To be accepted for the three years' course, students must have attained Inter B.Sc. Standard in chemistry, physics, and biology. Others would have to attend preliminary classes, making their course four years in all.

The whole course will include advanced organic and physical chemistry, biology with special application to nutrition, microbiology, the classification of bacteria, the physiology of digestion, metabolism and nutrition, the composition of foods and the distribution of nutriments, agricultural aspects of nutrition, and economic and sociological aspects of food production and food consumption. Successful candidates might hope to find responsible posts in the Ministries of Food and Health, or in the Colonial Service. The new course, it was emphasised, will not be confined to women, and it is hoped that a good proportion of men will join.

In answer to a question, Miss Copping said that graduates in nutrition would not be qualified to work as dietitians. The purpose of the course is not to train dietitians, but any graduates who went on to take training in di-

etetics, would undoubtedly be exceptionally well qualified. The college's old one-year course in dietetics would in any case be continued.

Animal Nutrition

According to Dr. John Hammond, F.R.S., teaching in animal nutrition must be related to research, which must in turn be related to existing agricultural conditions. In a survey of research and teaching centres, past and present, he mentioned Aberdeen, with its emphasis on minerals and vitamins, and Cambridge and Leeds, which had once specialised in studies on energy and protein requirements. Dairying has been the speciality of Reading and Ayr.

At Cambridge, the course occupies three days per week for a year, and must be taken by candidates for agricultural degrees. The subjects covered include animal husbandry and analytical methods, which are sometimes treated separately. Animal calorimetry is taught from an historical angle, and the student learns to calculate how much food must be given for each pound of live weight gain, or for each gallon of milk. He is also taught about the differences in the digestive systems between ruminants, such as cattle and sheep, and non-ruminants, such as pigs and poultry. He is shown how the plane of nutrition affects the development, and even the final body conformation of animals.

Work of the N.A.A.S.

Instruction in nutrition is also given to young workers at Farm Institutes, usually under the heading of Animal Husbandry. The National Agricultural Advisory Service gives instruction to adults. An officer who specialises in nutrition is attached to each province, and his knowledge is kept up to date by publications from the Commonwealth Bureau of Nutrition. Some large commercial firms also give instruction. Even the coupons of the rationing system had their educational value. They at least taught every farmer in the country the meaning of the word "protein"!

Nutrition and Catering

The various short courses in nutrition, or occasional lectures, which are given to personnel of various ranks in the Army, were reviewed by Miss F. E. Leben. In addition, members of the Army Catering Corps receive some instruction on nutrition during three month courses on cooking.

Miss A. Lumby indicated the place of nutrition in the Institutional Management Association Certificate course. It is obviously important that those who are to be concerned with the management of schools, hospitals, industrial canteens, hotels, and restaurants should understand the principles of nutrition. The instruction of many students, however, is hindered by their having failed to reach an adequate standard in the basic sciences while at school.

The activities of the Hotel and Catering Institute in sponsoring the teaching of nutrition were described by Mr. J. Fuller. He pointed out that the catering industry, the fourth largest in the country, is served by about 100 training institutes and 35 full-time technical colleges. Many trainees are candidates for the City and Guilds examinations. There is increasing scope for the employment of well trained "dietitian caterers."

Mr. C. C. A. Gibbs estimated that the hospital population in this country, including patients and staff, is about one million. About three million meals have therefore to be served daily. Progress towards the improvement of hospital catering, which until recently had often been notoriously bad, had been achieved largely through the King Edward's Hospital Fund. At a school organised by the Fund, courses of instruction are given for catering officers, cooks, and assistant cooks.

Courses at Technical Colleges

Another channel of teaching, according to Dr. H. E. Magee, was organised by a Planning Committee of the Nutrition Society at about the end of the second world war. It was arranged that courses should be given at technical colleges. Courses were to last not less than 120 hours, and were to be spread over not more than one year, with the inclusion of a qualified physiologist on the teaching staff. The training leads to an examination under the auspices of the Royal Sanitary Institute, and certificates are awarded to successful candidates.

The Food Industries

Dr. F. Aylward, in an informal contribution to the discussion, drew attention to the very large numbers of part-time students who are receiving instruction in various aspects of food technology, such as baking, chocolate, and confectionery making, and the meat trade. At the Borough Polytechnic, London, a two-year course on food technology is well attended. Lectures on nutrition are given after a course in science has been taken.

Such teaching arrangements might with advantage be coordinated more closely with university activities. At present an entrant into the food industry with a general B.Sc. could not be relied upon even to understand the nutritional significance of fats and carbohydrates. At the Technical School level, courses should be given on elementary food science.

B.Sc. Nutrition

In closing the proceedings, Prof. Yudkin said that education in nutrition concerns three classes of people. The first class includes us all, because everyone has to eat to live, and should know how food can influence his health. The second class includes those who have to teach nutrition as part of their profession, including doctors, caterers, school teachers, etc. The third class includes those who have chosen nutrition as their special career.

Prof. Yudkin would doubtless agree that the training of the whole time nutritionist must cover a very wide field of interests. Students must aim at being both good chemists and good physiologists. They must be well versed in certain aspects of medicine, and must enter willingly into the fields of biochemistry, bacteriology, genetics, applied ento-

mology and parasitology, agriculture, economics, sociology, and statistics. They must be prepared to jump, for example, from a detailed discussion of the role of vitamins in carbohydrate metabolism to a study of the sociological effects of world-wide soil erosion. The ambitious new course at Queen Elizabeth College has been planned to satisfy all the requirements for turning out the complete nutrition expert.

It is to be hoped that these high ideals will be tempered by a realisation of the limitations of a single human brain. A successful programme must not aim at teaching everything there is to know, but must select the most important things that can be fitted, without undue pressure, into the three years subsequent to Inter. B.Sc. An overcrowded syllabus will not result finally in a corresponding wealth of knowledge, but only in the replacement of calm study by frenzied "swotting." Among the more clever students no time will be allowed for developing the capacity for that independent thought which is essential for research. Those who are less clever will live in constant fear that examination failures may cut short their careers, or at least may prolong their course to five or more weary years after matriculation.

No doubt Prof. Yudkin, with Miss Copping and his other colleagues, is fully alive to these possibilities, and is engrossed in the fascinating problem of planning a syllabus that is both reasonably comprehensive and workable. All nutritionists will wish them, and their students, a good start in October towards making the new B.Sc. (Nutrition) a success.

A Gluten-free Diet

SINCE the first clear description of coeliac disease by the English physician Gee in 1888, many different diets have been devised for the treatment of the condition. The disease begins in early childhood and is characterised by chronic diarrhoea and stunted growth, but, in the absence of knowledge of the cause of the illness, treatment has been empirical. For a long time, a diet low in fats and in starch has been used with variable success, but this type of diet is difficult to devise, expensive, frequently very monotonous, and often far too low in calories to permit the child to thrive.

Recent studies of the disease in London (Sheldon, 1952)[1] and Birmingham (Anderson *et al.*, 1952)[2] have confirmed reports from Holland (Dicke, 1950,[3] and Weijers and van de Kamer, 1950[4]) that the gluten fraction in wheat and rye flour is the harmful agent in the food of children with coeliac disease. Preliminary attempts to treat these children with a diet from which gluten has been excluded are at present in progress; these give some grounds for hope that this regimen may be more successful than those of the past.

One of the difficulties inseparable from the regimen is the production of an appetising diet with gluten-free flour; this aspect is being studied at the East-Park Home in Glasgow. The physician to the Home is carrying out the trials, while Mr. R. Glen, the baker, is occupying himself with the baking technique. He has found that the absence of "body" is accentuated by the slightest error in baking; an increase of 2½ per cent. liquid produced a very rapid ferment and a loss of 50 per cent. oven spring, resulting in a loaf poor in volume and general appearance. A similar decrease showed a retarded ferment with a 16 per cent. loss in bread baked.

It is in the fermentation stage that the greatest differences are seen. The mixture is "ripe" after 23 to 25 minutes at 72°F., but the only safe guide is when the batter has exactly trebled its volume. Here a slight underproof produced a strong cheesy smell and taste, while a slight overproof showed rapid disintegration. Contrary to usual bakery practice, when increasing the bulk it is necessary to increase the yeast in the same ratio to produce a similar loaf.

By dissolving the yeast and sugar and mixing the starch to a smooth paste, then adding the salt and lastly the fat, the yeast was sufficiently retarded to give a bulkier loaf with better texture and brighter crust. Another bread was made using equal quantities of wheat starch and soya flour. Bread made with these ingredients, with a combination of fermentation and aeration, producing as it does a more solid type of dough, is an ideal vehicle for dates or sultanas in the afternoon tea-loaf style.

The benefits of gluten-free diet can be made more effective by making as wide a range of products as possible with the material allowed. To make coeliac children the object of envy rather than of pity builds up a psychological complex beneficial in the treatment of the child and of the disease. In order to produce a gluten-free birthday cake which would appeal to the children, a mixture containing 50 per cent. cornflour, 25 per cent. starch, and 25 per cent. soya was used, resulting in a cake light and spongy and fairly moist. The final difficulty was in deciding the temperature to fire a cake of large size, as a mixture of this type is liable to "boil" if the oven is too hot.

Only a prolonged and carefully controlled trial can show whether this new dietetic treatment has a more beneficial effect on children with coeliac disease than had the diets that were used in the past, and in particular, whether the children now grow in height as well as in weight, for this has hitherto proved a feature of the disease very resistant to treatment.

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The History of the Fishmongers' Company

Arthur E. May

The Worshipful Company of Fishmongers is one of the oldest of the London Livery Companies and also one of the largest, ranking in precedence as the fourth of the 12 "great companies." Fish was one of London's principal trades in the city's earliest days and has always been transacted on the north bank of the Thames around Billingsgate, which was one of the 10 gateways in the walls of the city.

THE Fishmongers have had many vicissitudes, but they have always managed to prosper. They had a guild in early Norman days, but Henry III dealt them a nasty blow by diverting the landing of all fish to the quay at Queenhithe, which had been built for the purpose of giving the Queens of England the toll on the vessels as pin-money. They then had a market in Old Fish Street, but when Edward I removed this restriction and gave them their first charter at the beginning of his reign in 1272, they moved to Fish Street Hill, where they built their first hall in 1321.

Early Fishmongers' Profits

Edward I was a great lover of fish, but he put a tight check on the Fishmongers' profits by limiting their retail prices to 3d. a dozen for the best soles, 6d. for the best turbot, 1d. for the best mackerel, 20 a penny for the best pickled herrings, 1d. a dozen for the best eels, and 2d. a gallon for fresh oysters! He also ordered all the dead meat of any whales accidentally stranded on our shores, to be sent to the royal palace, and made porpoises an exclusive royal dish. The city also took a hand in controlling the profits of the fishmongers, limiting these to a penny in the shilling, forbidding them to keep fish beyond two days if not salted, and compelling all fish to be landed at the chapel on the old London Bridge for checking before they were brought to the markets.

Rapid Expansion of the Trade

In spite of all these difficulties, trade expanded rapidly in the 14th century; many fishmongers became very wealthy, and exercised considerable influence on the government of the city, six of them being members of the Common Council in 1377. They secured a complete monopoly of the sale of fish but, in return, they had to furnish three ships for the Royal Navy. Several became Mayors of London (Lord Mayors at the end of the century); of these, the most noted in history was Sir William Walworth, who saved Richard II from the violence of Wat Tyler's rebel serfs when they invaded the city in 1381. In the 15th century they lost their monopoly but continued to carry out many important duties connected with the fish trade.

The Fishmongers' Halls

The fishmongers originally had two companies—the Salt Fishmongers and the Stock Fishmongers; they used the Stocks Market as well as their own. This market (so-called because it contained the original city stocks for the punishment of offenders) was near their first Hall, but both were destroyed by the Great Fire of 1666.

The two companies were united by order of Henry VIII, and their second Hall was built in 1671 by Edward Jarman, the architect, who was responsible for the building of the Drapers' Hall and the second Royal Exchange. It was a stately structure, consisting of buildings in the Grecian style arranged round a square court, but it was pulled down to make room for the building of the new London Bridge in 1830.

Designed by Mr. Scott, who later built London Bridge Station, the company's third and present Hall in Upper Thames Street was built in 1834. During the last war much of it was burnt when London was bombed, and when it was restored the old windows of the Grand Staircase, which had been destroyed, were replaced with new ones of heraldic design. At the same time, the Court Room was enlarged, the Court Drawing

The second Fishmongers' Hall built in 1671.

The Banqueting Hall, only slightly damaged during the war, has been restored.

Room entirely rebuilt in its old style, the ceiling of the Court Dining Room remade, and the Banqueting Hall, which was only slightly damaged, restored.

Among other treasures are portraits of royalty in the Banqueting Hall and on the Grand Staircase, some fine pictures of the Thames in the Court Room, a 16th century painting (the Company's oldest possession) in the Vestibule, portraits of past Prime Wardens and their Clerks in the Committee Luncheon Room, and coats-of-arms of past Wardens in the Banqueting Hall. In the Entrance Hall is a model of the Company's last State Barge, built in 1773, and broken up in 1850, also the original figure of St. Peter from the barge.

Present Duties and Activities

The Fishmongers' Company duties and activities are still very comprehensive. Under their charter of James I, they still examine all fish coming into Billingsgate Market and condemn any they find bad among the 500 to 1,000 tons which are unloaded daily. It is their duty to instigate proceedings under the Food and Drugs Act, 1938, if any bad fish is offered for sale.

The Company also takes a very active interest in salmon and other fresh water fisheries, in imported salmon, and in shellfish of all kinds. It takes proceedings under the Salmon and Freshwater Fisheries Act, against illegal methods of fishing, and marketing in the close seasons. It has a separate branch in Edinburgh to deal with offences in Scotland. The Salmon and Trout Association, formed by the Fishmongers' Company 50 years ago, meets at Fishmongers' Hall.

The Company has set up the Central Council for Rivers Protection, and has obtained some amendments of the law connected with pollution of rivers which it watches very carefully. It examines samples of all oysters and other shell-fish coming into London, and Medical Officers of Health all over the country keep in touch with its bacteriologist to prevent the spread of diseases, such as typhoid fever, which may arise from impure shell-fish.

Like most of the London Livery Companies, the Fishmongers' Company disburses its income chiefly in charities and in furthering education. It has its own public school (Gresham's School at Holt, Norfolk, founded in 1555), provides exhibitions and scholarships for other schools and colleges, besides spending large sums on technical education.

H.R.H. the Duke of Edinburgh is a member of the Court of Assistants of the Company, and H.R.H. the Duke of Gloucester is a member of the Company, having taken up his Freedom by Patrimony.

The Fishmongers' Company has been responsible for the organisation of the well known Doggett's Coat and Badge Race, rowed annually by watermen over a course of four and a half miles from London Bridge to Chelsea, ever since it was inaugurated in 1715 by Thomas Doggett, a Drury Lane actor.

The photographs shown in this article are reproduced by the courtesy of the Fishmongers' Company and Allom Bros., Ltd., who took them while carrying out recent restoration work at Fishmongers' Hall.

Storage of Spices

FOUR general rules for the storage of natural spices have been issued by the American Spice Trade Association: (*a*) keep them dry; (*b*) keep them as cool as possible; (*c*) keep them away from the sunlight; and (*d*) keep them covered.

The best practice is to store all spices in a separate room or a well-ventilated and dry out-building. The provision of air spaces between the containers is also desirable. Generally speaking, the humidity conditions needed for keeping spices fresh are similar to those for salt and sugar and the same arrangements will prove satisfactory for all these ingredients in most cases.

Storage temperatures should be between 50° and 60°F.; ground spices fare best in cool temperatures, but it is not usually feasible to give them refrigerated space.

Red-coloured spices should not come under the direct rays of the sun for very long; this is particularly important with paprika. This factor applies only to storage and not while the spice is being used.

Where possible, ground natural spices should always be covered. Drums with lever-type closures are sufficiently airtight.

Careful storage will ensure the retention of the fresh, pungent aroma and taste of the natural spices.

Australia's Canned Fish Industry

Peter Knox

The 12,210 miles of Australia's coastline range from the tropical waters of the north, home of the trochus, pearl, and beche-de-mer, to the southern icy haunts of the Antarctic whale. In 1950-51 these seas yielded £7,500,000 worth of scale fish, prawns, oysters, whale oil and meal, mother of pearl, and trochus shell. In the same period frozen crayfish tails exported to the United States of America earned 1,800,000 dollars.

THE Australian canned fish industry has, since 1938, grown into a vigorous, progressive industry with a capital value of just on £A1,000,000. Production, in common with many other of Australia's fast developing secondary industries, has swept upwards in recent years, but still satisfies only about one-quarter of annual requirements.

In 1939-40 Australia canned approximately 2,936,000 lb. of fish. During the peak period in 1948-49, partly caused by temporary British Ministry of Food orders, more than 16,000,000 lb. of fish, worth more than £A1,000,000 wholesale, were canned. Production has since steadied at about 12,000,000 lb. annually.

Fish canning on the Australian mainland began on a permanent basis in 1938 in an old boatshed at Narooma, a small seaside resort on the south coast of New South Wales. Until then, practically the whole of Australia's canned fish was imported, although one Tasmanian firm, Henry Jones and Co. of Hobart, had been canning since 1905.

Fish are thrown into the automatic scaling machine at the Eden cannery.

By 1940 a modern £A25,000 factory, with an annual capacity of 8,000,000 12 oz. cans, was in production for Narooma Fish Cannning Pty. Canneries were also established in every State except Queensland.

The Eden Cannery

At Eden, New South Wales, Australian Fishing Industries amalgamated with the canning interests of Green's Products to form one of Australia's largest and most efficient fish processing concerns.

Australian Fishing Industries had constructed a concrete wall around the beach front, and a jetty 530 ft. long by 20 ft. wide equipped with floodlights for night work, filled in a lagoon, removed a sandhill, and installed ice works, a cold store, a cannery, a Canadian smokehouse, a quick freezer, slipway engineering facili-

From the scaler the fish slide down a chute to a band saw which cuts off their heads.

ties, a boat building shop, a large ship's chandlery store, and a canteen which serves three-course meals well into the night. It built houses for its staff and helped to establish a timber mill to provide the timber, and it built a dam to ensure water supply.

At the cannery of the combined company, Eden Canneries Pty. Ltd., fishermen unload their catch, see it weighed and receive payment within a few minutes. Ice is delivered into their boats, and shore engineers carry out dockside maintenance and repairs to these, thus avoiding unprofitable delays in port.

The Eden cannery is one of 17 plants in Australia, wholly or mainly engaged in canning fish, and turns out 150,000 four oz. cans, 70,000 16 oz. cans, and 60,000 12 oz. cans of processed fish each week. Australian salmon, barracouta, tuna, whitebait, mackerel, pilchards, and minor quantities of other fish are processed, salmon and barracouta accounting for about 90 per cent. of the total output.

Canning methods follow standard practice and, apart from the usual equipment, the management has installed a new type of fish scaler which has been developed in South Australia. An irregularly surfaced revolving floor hurls the fish by centrifugal force against angle iron scrapers welded to the sides of the container and against each other.

In 1950, the cannery extended its premises to incorporate a fish meal plant for the processing of offal.

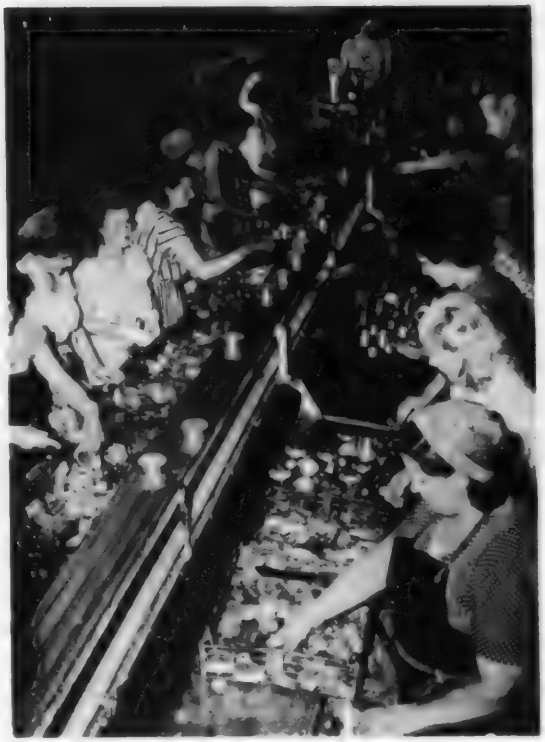
The island of Tasmania is the largest canning State and usually produces over 40 per cent. of the annual Australian output. Australian canned fish production is limited only by the yields from fishing grounds.

Inshore fishing is already being exploited almost to capacity in south-eastern Australia, the most densely populated area. However, there are vast undeveloped trawling grounds along the north-west coast of Western Australia and in the Great Australian Bight. These have been neglected because of their distance from the centres of population, but many experts believe that air-freighting will eventually solve distance problems.

Tuna Canning

At present Australian interests are concentrating on tuna fishing to step up supplies to canneries. Tuna exist in commercial quantities in the waters of south-eastern Australia and off the north-west coast of Western Australia.

Samples of Australian canned tuna have been well received overseas and the Australian public has responded favourably to it. It seems likely the Australian demand for canned fish will rise shortly.



Above: **The fish fillets are filled into cans.**
Below: **Charging the retorts.**

With an expected population of about 11 million by 1960 consuming fish at the 1950-51 rate (17·4 lb. of fish per head, fresh whole weight basis) Australia will need at least another 45,000,000 lb. of fish yearly. Australians are traditionally meat-eaters; but food habits may alter, and among the thousands of migrants coming to Australia every month are many whose home diet had included a lot of fish.

Beside this, much less canned fish was imported into Australia in 1952-53 under the Federal Government's plan to save money by temporary import restrictions. In 1950-51, Australia imported nearly £A4,000,000 worth of fish, principally from the United Kingdom, South Africa, Norway, New Zealand, and Russia.

Supply restrictions and population increases augur well for Australia's fishing industry; even with big production increases of recent years, only about 25 per cent. of canned fish on the Australian market is now locally processed.

News from the Industry

Refrigeration at Bromborough

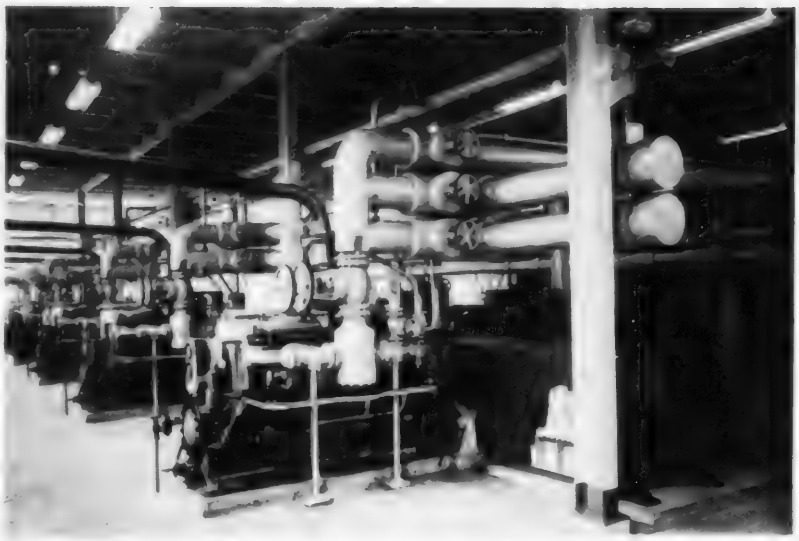
A new refrigeration plant, one of the largest industrial installations of its kind in the country, was set in operation on June 12 at the Stork Margarine Works of Van den Berghs and Jurgens, Bromborough, by Prof. Gordon Stephenson, head of the Department of Civic Design at the Liverpool School of Architecture.

Erected at a cost of approximately £200,000, the new plant has a capacity of 1,650 standard tons of refrigeration, the circulating cooling water required amounts to 110,000 gallons per hour, and the total length of tubing in the condensers amounts to 78,000 feet. An unusual aspect is the extensive use of psychromatics in the decoration of the plant and equipment. The gross installed driving power of the equipment is 2,865 h.p.

There are 10 main ammonia compressors of the quadruple-cylinder vertical high-speed type of 160 standard tons capacity each and Veebelt driven at 400 r.p.m. by 6,600 volt electric motors of 275 h.p. running at 980 r.p.m. An auxiliary 40 ton twin-cylinder compressor with 65 h.p. drive is provided for general draw-off purposes. All compressors are provided with magnetic separating suction strainers, packed oil separators, and the requisite complement of control valves and gauges.

The condensing equipment, mounted on the flat roof, is of the atmospheric interlaced coil type. Two condensers are provided, each consisting of 45 stacks of 36 × 1¼ in. pipes 24 ft. wide. Four receiving vessels are installed to provide storage for 7,000 pounds of liquid ammonia.

Three centrifugal pumps deliver the necessary cooling water required by the condensers, while two smaller pumps provide cooling water for the ammonia compressor cylinder jackets.



Each of the main ammonia compressors is of the quadruple cylinder vertical high-speed drive type of 160 standard tons capacity and one Veebelt driven at 400 r.p.m. by 6,600 volt electric motors of 275 h.p. running at 980 r.p.m.

A central control panel equipped with pressure and temperature gauges forms the main station from which liquid ammonia is distributed to supply the refrigeration requirements of the various production departments in the works.

The refrigeration plant was supplied by J. and E. Hall, circulating pumps by The Pulsometer Engineering Co., electric switchgear by A. Reyrolle and Co. and Brookhirst Switchgear, and fluorescent lighting fittings by The British Thomson-Houston Co.

Courses in Food Technology

The following courses are offered by the National College of Food Technology for the session which commences in October, 1953:

(A) *Postgraduate Courses in Applied Microbiology and in Food Quality Control.*—These courses will consist of both lectures and practical work and full use will be made of the pilot-scale plant to provide samples for examination. Each course will extend over one session. Successful students will be awarded a Diploma of the College. The fee for each course is £60.

(B) *General Food Technology.*—This is a two-year full-time course which provides instruction in the basic sciences related to food technology and in their practical application to food processing operations, and will include training in industrial management. Applicants should be not less than 18 years old. The fee is £60 per annum. Successful students will be awarded a Diploma.

(C) *Regional Courses* covering the meat, fish, milk, fruit, and vegetable trades.

General view of the newly opened refrigeration plant at Bromborough which shows the carefully planned pipe layout.

OBITUARY

Mrs. Grace Mansfield, wife of Mr. S. R. Mansfield, director of Polak and Schwarz (England), on May 31.

*

Mr. P. A. W. Came, chairman of Joseph Crosfield and Sons and William Gossage and Sons, and a director of Industrial Soaps, on June 24.

Mr. Came was also chairman of the Oil Hardeners' Committee; a member of the General Council and chairman of Group E of the Association of British Chemical Manufacturers; and a member of the Joint Industrial Council of the Soap, Candle, and Edible Fat Trades Employers' Federation.

Summer Meeting of Dairy Technologists

PRESENTATION OF GOLD MEDAL

The 1953 Summer Meeting of the Society of Dairy Technology, under the chairmanship of Mr. A. L. Dobson, the President, was held at Scheveningen, Holland, on Sunday, June 21, and marked yet another milestone in the Society's short but impressive history, in that it was the first time that such a meeting was held in a foreign country. This was arranged with the object of encouraging as many members of the Society as possible to participate in the 13th International Dairy Congress at Scheveningen on the five following days.

In addition to a very large attendance from the British party, many prominent people connected with the dairy industry in the Dominions, U.S.A. and Europe were present to hear Dr. P. N. Boekel, the Director of the Dairy Division of the Netherlands Ministry of Agriculture, Lands and Food, give a lecture on "Dairying in Holland." This was followed by an interesting discussion which was ably opened by Dr. A. L. Provan, the Chief Chemist of the Milk Marketing Board.

At the termination of these proceedings, the chairman called upon Prof. H. D. Kay, the Director of the National Institute for Research in Dairying, to present the Society of Dairy Technology Gold Medal to Prof. William Riddet, the Director of the Dairy Research Institute at Palmerston North, New Zealand.

This award has been instituted to give due recognition to anyone who, in the view of the Council, has rendered particularly distinguished service to the dairy industry. The award is open to the world and will not be made more than three times in 10 years.

Prof. Kay, in making the presentation, gave a brief outline of Prof. Riddet's career. After a post-graduate period at the West of Scotland Agricultural College, he went to New Zealand in 1925 as Professor of Agriculture at Auckland, and in 1927 was appointed to the Chair of Dairying at Massey Agricultural College (of which he is now Vice-Principal) and to the Directorship of the Dairy Research Institute of New Zealand. He did pioneer work in both these posts and virtually created both the Dairy School and the Research Institute.

Since then he had been responsible for most of the higher training in dairy science and technology in New Zealand. He had raised dairy educational standards to a high level, and extended technological training to include periodical refresher courses for those engaged either in farming or in the more industrial aspects of dairying.

As Director of the Dairy Research Institute, he had also had, for over 25 years, the major responsibility in New Zealand for advancing new knowledge of dairy science, and had provided many new ideas and facilities for research workers. A long series of valuable publications of the findings obtained had given this Institute a high reputation, not confined to New Zealand. He had been for several years a member of the Research Council of the Department of Scientific and Industrial Research. The high quality of New Zealand agricultural and dairy research workers sent abroad was a sufficient indication both of their training and the careful selection undertaken by Prof. Riddet and his colleagues on this Council.

Tireless and far-sighted, with great organising ability and ripe wisdom, the outstanding leader of a team of enthusiastic colleagues, Prof. Riddet had played a major part in the progress and development of dairy technology and the dairy industry in New Zealand.

In acknowledging the award, Prof. Riddet said he was deeply conscious of the honour which had been conferred upon him by the Society and added that the Medal would remain among his most prized possessions. He then gave an address on "Some Aspects of the Dairy Industry in New Zealand," after which the meeting terminated.

Dr. J. G. Davis

Although he has resigned his appointment as Director (Technical) of the Express Dairy Co., Dr. J. G. Davis will continue his association with the company and its subsidiaries by acting for them in a consultant capacity.

Some of the new packaging designs produced for Fletchers of Selby by Richard Lonsdale-Hands Associates. New designs have now been made for Golden Grill sauce, malt vinegar, gravy browning, and Parisian essence.

Strapping for Packaging

Considerable developments have taken place in the field of flat-band tensional steel strapping over the last few years. In industry its use not only safeguards the movement of goods outside the works, but also considerably reduces the amount of manhandling inside the works, thus increasing and cheapening production.

Fundamental changes have been made in the method of sealing the band and great increases in the ratio of seal strength to tensile strength of the band have been made. The British Standard Specification for strapping calls for tensional strength relationship between the seal and the band of not less than 75 per cent.; this requirement is amply fulfilled by Seal-less equipment which makes the join out of the steel strip itself without using separate seals or clips.

Such strapping is already being used extensively for the packaging of biscuits, fats, confectionery, frozen and canned foods, and for palletisation, steel tape being used to strap the containers to the pallet itself.

Precision machines are produced by Seal-less Strappings Ltd. to deal with all sizes of strapping for every kind of package, whatever its size, weight, or shape.

Food Containers

Collapsible containers, made of steel or light alloy which are suitable for transporting solids, powder, and liquids, by road, rail, sea, or air, are manufactured by Drums Ltd. The company has also recently evolved a new and thoroughly ventilated container for the transport of perishable foodstuffs of all kinds.

Food Research at Leatherhead

PLEA FOR SUPPORT FOR RESEARCH ASSOCIATION

The Seventh Annual General Meeting of the British Food Manufacturing Industries Research Association was held on June 11, at The Institution of Electrical Engineers. The kind co-operation of the Institution in making its premises available on this occasion enabled the Association to arrange for a demonstration of electronic equipment designed to detect the presence of extraneous matter in foods. Various types of equipment were exhibited by eight leading manufacturers, the majority being in actual operation.

Sir Frank Engledow, C.M.G., M.A., F.R.S., Drapers' Professor of Agriculture in the University of Cambridge, chairman of the Food Investigation Board, was again re-elected President of the Association, an office which he has held since 1947 when the Association was first formed.

Mr. J. G. Mathieson (Clarnico Ltd.) and Lt. Col. G. R. Harding, D.S.O., M.B.E. (Aplin and Barrett Ltd.) were both re-elected Vice-Presidents, and in addition to 10 retiring members of the Council re-elected to office, Mr. A. J. Birch (Roberts and Birch (Burton) Ltd.), Mr. A. W. McIntosh (Mars Ltd.), and Mr. Andrew C. Wilson (Newforge Ltd.) were elected members of the Council.

The Annual Report and Accounts for the year ending December 31, 1952, were duly adopted and certain changes in subscription scales to take effect from January 1, 1954, made necessary by the changing terms of Government grant, were approved without dissent.

A report of Sir Frank Engledow's Presidential Address on "The Food Manufacturers' Attitude to Science" is published elsewhere in this issue.

In his report, Mr. E. E. Wells (Rowntree and Co., Ltd.), chairman, said that 1952 had been a very satisfactory year. Progress of work had been maintained, and the new laboratories at Leatherhead were now adequately staffed. The chairman then dealt with various aspects of the Association's affairs, including the position of the Land, Building, and Equipment Fund; he appealed for further donations to clear the deficit which still remained, and explained certain points concerning the Government grant and subscription income position.

A further appeal was concerned with the introduction of new members. It was the industry's duty fully to support its Research Association and manufacturers could not fail to benefit from such support, whether in a large or small way of business. Those manufacturers not in membership had benefited indirectly from the work of the Association, and had much for which to thank those who had supported the two former Associations and the present Association so loyally over the past 30 years.

In conclusion, the chairman said that today we were constantly being urged to greater efforts and productivity. Research and development were therefore more than ever necessary and the industry must realise this. Old methods would no longer do, however well-tried. With the return of a free economy and competition, those firms who would not face up to these facts and who looked upon co-operative research as a luxury they could not afford, rather than as a prerequisite to progress, would soon find themselves at a disadvantage compared with their more enlightened contemporaries.

At the Council meeting following the Annual General Meeting, Mr. E. E. Wells was re-elected chairman of the Council for the ensuing year, and Mr. R. P. Woollard (London Oil Corporation) was elected deputy chairman vice Mr. W. B. Chivers (Chivers and Sons, Ltd.), who retired from that office.

Changes of Address

The Bristol office of Musgrave and Co. has been removed to 1, Host Street, Bristol, 1. Telephone and telegraphic address are as before, viz. Bristol 23369 and "Centigrad, Bristol."

▪

The head office of Peerless and Ericsson is now at 1, Carlisle Road, The Hyde, Hendon, where extensive additions and alterations have been made to their factory.

Birmingham Office Closed

The resident representative covering the Midlands, Mr. A. Reginald Dark, has left C. Skerman and Sons. For the time being, therefore, their Birmingham office has closed, but all enquiries from this area will be handled from the London office until the appointment of a new area manager.

Intensive Courses in Bakery

An important development at the Borough Polytechnic is the provision of a series of intensive courses each of four weeks' duration. The first of these, devoted to breadmaking, will begin on Monday, October 5, and conclude on Friday, October 30. This will be followed by a course on cake-making from Monday, November 2, to Friday, November 27. The fee for each four weeks' course will be £10 and detailed syllabuses are now available.

The courses will be under the immediate direction of Mr. John Seade, who has had many years of industrial and teaching experience and who served in the Army Service Corps as Major in charge of field bakeries.

The courses are designed primarily for men over the age of 23 years who have had baking experience but who have not had the opportunity of following a full-time diploma or a part-time City and Guilds Course. The emphasis will be on practical work with a limited number of explanatory lectures.

Holiday Closure

During the annual holiday from July 25 to August 10, the works of the Purdy Machinery Co. will be closed. The offices will be open as usual and there will be a small skeleton staff in the works to handle emergencies.

Samples of the reprinting of cartons which have been carried out for Hales Home Bakeries of Clevedon by Brown, Bibby, and Gregory.

APPOINTMENTS AND RETIREMENTS

On his appointment as managing director, Mr. Cyril C. Harris, general manager of George Borwick and Sons for the past six years, has now joined the Board of the company.

■

It has been announced by Mr. J. J. Fraser, managing director of Honeywell-Brown, that Mr. V. D. MacLachlan and Mr. L. R. Price have been appointed to the Board of the company. Additionally, Mr. MacLachlan has been appointed general manager.

*

The newly appointed manager of the edible oil refinery at the Stork Margarine Works of Van den Berghs and Jurgens at Purfleet, is Mr. C. B. Read. He was formerly assistant production manager of the margarine factory and succeeds Mr. H. Gates, who is taking up a technical position in India. Mr. Read is an M.Sc. of London University.

■

Acting on medical advice, Mr. Walter Watts and Mr. H. Lightfoot, home sales and export directors of Stevenson and Howell, retired at the end of May at the ages of 76 and 73 respectively.

Mr. Watts joined the firm in 1894 and was elected to the Board in 1917. Mr. Lightfoot joined the firm in 1899 and was elected to the Board in the same year as Mr. Watts.

*

The directors of Foster Clark announce that Mr. Kenneth E. Loveland has accepted their invitation to join the Board of Directors. Mr. Loveland has served the company in administrative positions for over 26 years and is thus well equipped to act as Administrative Director.

The Board has also appointed Mr. Norman E. Goddard to the post of assistant managing director. Mr. Goddard joined the Board of Directors in April, 1952, after occupying an executive position in the company for 18 years.

*

At the Annual General Meeting of The Institute of Physics, Dr. C. Sykes, F.R.S. (managing director, Thos. Firth and John Brown Ltd.) was re-elected President.

Prof. F. A. Vick was elected a Vice-President, Dr. S. Whitehead was re-elected Honorary Treasurer, and Dr. B. P. Dudding was re-elected Honorary Secretary. The two new ordinary members of the Board elected were Mr. A. T. Pickles and Dr. P. S. H. Henry.

Prof. A. M. Tyndall, C.B.E., F.R.S., was elected to Honorary Fellowship, the highest honour which the Institute can bestow. Prof. Tyndall was Professor of Physics in the University of Bristol for many years and is known for his distinguished fundamental work on the mobility of ions and for his services to science and education. He is a Founder Fellow of the Institute and a Past-President.

■

At the Annual General Meeting of the Institute of Cost and Works Accountants, Mr. Francis W. H. Saunders, F.C.W.A., was elected President for 1953-54.

Mr. Saunders, who is manager of Peak Frean's clerical organisation, represents the Institute on the British Standards Institution Committee for Office Equipment and Supplies Standards, and was a member of the first Research Committee that produced the booklet, "The Problem of Selling and Distribution Cost Accounting," in 1940.

■

The following Officers and Executive Committee will serve the Association of British Insecticide Manufacturers during 1953:

Chairman: Mr. N. K. Smith (The Murphy Chemical Co. Ltd.).

Vice-chairman: Mr. M. N. Gladstone (Pest Control Ltd.).

Hon. Treasurer: Mr. D. J. S. Hartt (May and Baker Ltd.).

Hon. Auditor: Mr. A. G. Ponton (Pan Britannica Industries Ltd.).

Executive Committee:

Dr. J. R. Booer (F. W. Berk and Co. Ltd.).

Mr. E. T. Bugge (Bugges Insecticides Ltd.).

Mr. J. M. Butler (Shell Chemicals Ltd.).

Mr. D. J. S. Hartt (May and Baker Ltd.).

Mr. H. G. Huckle (Shell Chemicals Ltd.).

Mr. F. W. Sugden (Plant Protection Ltd.).

Ex officio members of Executive Committee:

Dr. E. Holmes (Plant Protection Ltd.).

Mr. H. J. Jones (Hemingway and Co. Ltd.).

■

The following Officers and Executive Committee will serve the Industrial Pest Control Association for the year 1953-54:

President: Mr. Duncan R. Leitch (Ratsouris Ltd.).

Vice-president: Mr. K. F. Goodwin-Bailey (Cooper McDougall and Robertson Ltd.).

Hon. Treasurer: Mr. S. F. Sprange (The London Fumigation Co. Ltd.).

Hon. Auditors:

Mr. S. Bremer (The Ideal Insecticide Company).

Mr. R. A. H. Freemantle (Stemco Ltd.).

Executive Committee:

Mr. D. J. S. Hartt (May and Baker Ltd.).

Dr. N. E. Hickin (Rentokil Ltd.).

Mr. A. Fraser McIntosh (Thomas Harley Ltd.).

Mr. I. A. Mackay (Imperial Chemical Industries Ltd.).

Mr. G. Pollard (Petrochemicals Ltd.).

Mr. S. W. Hedgcock (*ex officio*) (Chelsea Insecticides Ltd.).

Secretary: Mr. W. A. Williams, M.B.E., B.Sc.

Automatic Control Instruments

A new hydrostatic contents controller and indicator, the general system and operation of which is similar to that of their well-known hydrostatic contents gauge, has been introduced by K.D.G. Instruments. This gives continuous reading at a distance without external source of power. The various transmitters fitted on the tank are also the same as the hydrostatic contents gauge, with suitable units to meet the requirements of general industrial, marine, chemical, paperstock and semi-solids, light industrial and vehicular, food, breweries, etc.

The controller is available with indicator dial sizes of 7 in. and 10 in., the latter being suitable for either flush panel mounting or wall mounting; the former is available for wall mounting only.

In both cases the switch circuit can provide snap action contact at one level only or, with the use of relay equipment, two level contact arrangement is available. A wide range of relay equipment can be offered similar to the range available with the micro-pressure switch and liquid level switch.

A feature of the controller is that the switching unit is independent of the indicating pressure element, thus true indication at all levels is guaranteed. Further, the switch contains precision setting with extremely small differential.

COMPANY NEWS

In the report of the directors of J. Lyons and Co., for the year ended March 31, 1953, it is stated that the net profit for the year, after providing for all charges, is £689,451, compared with £615,075 for last year.

The directors propose to pay a final dividend of 3s. 6d. per £1 unit (making 4s. 6d. per £1 unit for the year) on the Ordinary Stock and the "A" Ordinary Stock, and a final dividend of 8·4d. per £1 unit or share respectively on the Proportional Profit Stock and "B" Proportional Profit Shares (making 10·8d. per unit or share for the year).

▪

According to a recent statement by Lord Baillieu, Dunlop chairman, 1952 was the best trading year achieved by Semtex in their whole history.

BOOKLETS RECEIVED

All aspects of remote control equipment are described in a recent catalogue issued by Teleflex Products.

▪

A manual describing the Comet colliery conveyor belt jointing system has been published by the Mastabar Belt Fastener Co.

▪

A new leaflet issued by Kestner Evaporator and Engineering Co. is concerned with the company's different types of evaporation plant.

▪

Three recent pamphlets issued by the Alfa Laval Co. describe the company's plate heat exchangers, self-opening separator, and the new De Laval desludger.

▪

A leaflet describing the new unit coolers has been issued by York Shipley. Because these coolers can be equipped with a defrosting device, they are equally suitable for high and low temperature duties.

▪

A practical and comprehensive guide dealing with the wide range of cranes made by Geo. W. King has just been published. Comprising 112 large pages, this well-produced and fully illustrated book covers the whole field of crane design, materials, manufacture, operation, and maintenance.

▪

New illustrated leaflets issued by Shell Chemicals give practical advice on the many uses of Teepol in the food processing industry and on retailers' premises for cleaning processing equipment, for general cleaning of washable walls and ceilings, windows, floors, cloakrooms, and for the washing up of cutlery, crockery, and glassware in canteens.

OBITER DICTA

● Water is a lovely thing.—*Mr. H. W. Cremer, chairman of the Thames Survey Committee.*

● Fruit salad packed inside a melon travels beautifully.—*Ursula Bloom, in "The Lady."*

● In ten years' time, beef might be a luxury to be eaten about once in three months.—*Dr. C. I. C. Bosanquet.*

● My own preference is for the kipper of convention, the succulent beauty with its skeletal herring-bone pattern of calcium.—*Mr. Bernard Hollowood.*

● The comfort of our tummies greatly affects our point of view and our attitude to everyday problems.—*Lord Teviot, speaking in the House of Lords.*

● How literary is the average beer drinker? Is he sufficiently in love with the language to stand on a pavement and read a posterful of polished prose?—*"Advertiser's Weekly."*

● Many people say they don't like brown bread—but that is because they have never tasted the real thing or felt the benefit from eating it regularly.—*Mr. C. Morris, in a letter to "Picture Post."*

● Fish as a food can without blushing bear comparison very favourably on price and quality, and especially nutritionally, with the best of all foods, and needs no excuses.—*"Fish Industry."*

● The general manager of a small cannery must be an authority on most phases of food preservation and a good judge of regional tastes in foods.—*Mr. W. A. Green, manager of a New Orleans canning firm.*

● I loathe being told that the substance I am eating has been "shot from guns" or that it is the "crunchiest, munchiest, scrunchiest breakfast in the world." Nor do I want to know that the rice, oats, chaff, bran, or what you will has been rolled, milled, grilled, flattened, fried, or toasted; I am interested in eating it, and could not care less how it is made.—*Mr. W. V. Curtis, in a letter to "Advertiser's Weekly."*

ERECTIONS AND EXTENSIONS

The factory premises at West Chirton, North Shields, are to be extended by Welch and Sons.

▪

Pollution and fisheries laboratories are being constructed by Trent River Board at Meadow Lane, Nottingham.

▪

Factory premises in Fitzwilliam Road, Rotherham, Yorks., are to be extended by Kenyon, Son and Craven.

▪

The Ministry of Agriculture and Fisheries are to erect a new research station on a site at Worthing Road, Littlehampton, Sussex.

▪

Plans have been prepared by J. T. Food Products to carry out extensions to their factory at 3, West Bawtry Road, Rotherham, Yorks.

▪

A single-storey food factory is to be constructed on a site at Basingstoke Road, Reading, Berks., by Chr. Hansen's Laboratories.

▪

Coastal Food Recovery have had plans prepared to erect a new factory and storage bunkers at Mount View Avenue, Scarborough, Yorks.

▪

A scheme to carry out extensions to their bakery in Vicarage Road, Blackpool, has been prepared by Burton's Gold Medal Biscuits.

▪

A new bakery is to be constructed on a site in Widford Hall Lane, Chelmsford, for W. Budd, bakers and confectioners, of Chelmsford, Essex.

▪

Plans to extend their factory premises have been drawn up by Gray, Dunn and Co., biscuit makers, of Glasgow.

▪

Plans have been approved for Pickerings Produce Canners, Ltd., to carry out extensions to their factory at Newbridge Lane, Stockport, Cheshire.

▪

Plans to extend their premises at Crimscott Street, London, S.E.1, are being drawn up by Crosse and Blackwell. Estimated cost of this project is £90,000.

▪

An extensive forward production programme for both existing and new ranges has made it necessary for Honeywell-Brown to move to premises two-and-a-half times as large as their present factory at Blantyre. The new factory is situated on the Newhouse Industrial Estate at Motherwell, Lanarkshire, and extends over an area of 75,000 sq. ft.

World Food News

Mechanical Engineering Congress

The Fifth International Mechanical Engineering Congress will be held in Italy from October 9 to 15, 1953, at Turin, at the *Palazzo delle Esposizioni del Valentino*, within the scope of the *Salone Internazionale della Tecnica*, which will be visited by participants.

The theme of the Turin Congress, which will be followed by a study tour, will be "Production and Assembly Methods for Components in Mechanical Engineering," that is to say, examination and comparison from the technical and economic viewpoints of various methods available to industrialists in manufacture.

The U.S. Chemical Industry

A collection of current facts and information about the industry is contained in the first edition of *The Chemical Industry*, which has been published by the Manufacturing Chemists' Association, Inc.

The three sections of the book are concerned with the growth of the chemical industry, the way in which it operates, and chemicals in everyday life. Included in this latter section is a useful chapter on chemicals and food.

Food Research in Sicily

By decree of August 1, 1950, enacted by the President of the Sicilian Region, an experimental centre was inaugurated for the food canning industry. The new Institute has achieved much since it started and is now concerned with the following activities:

(*a*) Studies on the canning of fish and vegetables.

(*b*) The adoption of a distinctive quality mark on typical Sicilian products.

(*c*) A three-year programme for the production of selected varieties of tomatoes for the food industry.

(*d*) Studies on the vitamins contained in Sicilian fish livers.

(*e*) Research on the industrial production and application of pectins from oranges, citrons, and lemons.

(*f*) Research on the production of orange, lemon, and citron juice.

(*g*) Research on the copper content of tomato preserves destined for export.

(*h*) Maintenance of the natural qualities of essential oils from Sicilian fruits by means of special analytical methods to detect adulteration, and the maintenance of their stability.

(*i*) Studies of methods for the determination of colour in tomato concentrates.

(*j*) Research on the application of high vacuum evaporation techniques.

(*k*) The publication of a technical and scientific periodical.

(*l*) Analytical control of food products destined for export.

American Bakery Standards

A further publication in the series developed by the Baking Industry Sanitation Standards Committee of America deals with sanitation standards for pan washers, rack washers, utensil washers, and industrial sinks.

Flavours Factory for S. Africa

A new factory, representing their 17th affiliated company and situated in Roodepoort near Johannesburg, has been established by Polak and Schwarz. Mr. J. Ph. C. Wessing has been appointed managing director.

In establishing this branch, the company, in collaboration with their local agents—H. L. Hompes and Co., of Durban and Cape Town, Mr. D. Cohen, of Port Elizabeth, and Mr. Isenberg, of E. London—hope to give better service to their customers in S. Africa.

Catalase in Research

Liver catalase, known as Armour Catalase 10, is now being offered for development work to research workers. The material is a tan coloured powder which is believed to have a potentially large number of food and industrial applications because of the specific reaction of catalase with hydrogen peroxide.

The enzyme catalase, when brought into contact with dilute solutions of hydrogen peroxide, converts it rapidly into water and oxygen. This property makes it possible to stop the action of hydrogen peroxide at any desired point in a processing application. For this reason, catalase is being evaluated in conjunction with hydrogen peroxide for the selective control of micro-organisms in dairy products and other edible preparations.

Catalase and hydrogen peroxide can also be used in fermentation processes, and in the control of bleaching or oxidation in such fields as soap, textile, fur, and cosmetic processing. Since one pound of catalase is capable of liberating almost 5,000 cu. ft. of oxygen from dilute solutions of hydrogen peroxide, the enzyme has obvious potential applications as an *in situ* blowing and foaming agent in aqueous systems. A convenient means of obtaining oxygen is also indicated.

Irish Canners Open London Office

A London marketing office has been opened at Shell House, 55, Bishopsgate, London, E.C.2, by Lunham Bros., meat packers, processors, and canners, of Cork. This office is under the management of Mr. F. W. Lloyd.

Britain Takes More Dutch Pork

Britain has informed Holland she will take 7,500 tons more Dutch pig meat products in the second half of this year. This will bring Britain's total purchases of these products in the whole of 1953 to 36,000 tons. The Dutch Minister of Agriculture says that Dutch pig meat output in the second half of this year will be about 5 per cent. higher than in the corresponding period last year.

Total pig production for the current year will be about 3 million head compared with 2,650,000 in 1952. About 350,000 more pigs will have to be sold during the year, most of them for export. Dutch meat exports have so far been running at a lower rate than in 1952, but there are better prospects for the second half of the year.

The Minister states that an expected expansion in egg production during the second half of the year will give extra supplies amounting to about 325 million eggs. Exports during that period will have to be increased to about 1,000 million and indications are that Germany will be the main outlet.

Liquid Dispenser

Through the use of an automatic dropper that dispenses liquids directly into uncapped containers filled with food products as they move by conveyor to the capping area, food flavouring and neutralising can be accomplished with a high degree of accuracy in one operation. Designed to dispense liquids in amounts ranging from a single drop to 44 ml., at a rate as high as 150 containers per minute, the unit simplifies handling and saves time.

The unit, known as the "Micro Portioner," is specifically useful in (1) adding volatile flavouring materials to canned foods, (2) measuring acid into tumblers before filling with non-acidified jelly, (3) adding solutions of calcium salts to canned tomatoes and potatoes, and (4) supplying monosodium glutamate to canned and frozen foods.

The dispenser consists of a removable glass syringe, with a controlling valve, that holds the ingredient to be dispensed, and a pipette device with connecting tubing, that measures and discharges the liquid. By placing an electrical switch in the container production line, a solenoid is used to provide the force needed to eject the liquid through the pipette. The nylon ballcheck valve promotes a flow control that ensures accurate drip-free delivery of liquid into each passing container without stopping the conveyor.

OVERSEAS ENQUIRIES

Fine Salt

S. P. Musson, Son and Co., Ltd., 5½, East Parade, Kingston, Jamaica, wish to represent a United Kingdom supplier of fine salt.

United Kingdom firms who may be interested in this agency enquiry should communicate with the company direct.

*

Cornflakes for Holland

Messrs. H. Barends, Hooikade 38, The Hague, has expressed interest in contacting United Kingdom suppliers of cornflakes.

Any United Kingdom firm interested in this enquiry should communicate direct with the Netherlands firm.

*

Jams, Jellies, and Marmalades

The Hillcrest Products Co., of 260, California Street, San Francisco, is interested in representing a United Kingdom manufacturer of jams, jellies, and marmalades on a direct basis.

United Kingdom firms who are interested in this enquiry should communicate direct, by air mail, with the company, quoting prices c.i.f. in dollars.

*

Ling Fish and Potatoes

H. G. Gatcliffe and Co., P.O. Box 504, Port of Spain, Trinidad, B.W.I., have expressed interest in representing United Kingdom suppliers of good quality ling fish and potatoes.

There is a considerable demand in Trinidad for dried salted fish and for many years the bulk of supplies have been obtained from Newfoundland. Within recent times, however, there have been importations of this foodstuff from the United Kingdom which has been well received. This market usually draws its supplies of potatoes from Canada and the Netherlands but there are periods of the year when it is not possible to ship from either country. In shipping potatoes to this market it is important to take every precaution to ensure that the potatoes arrive at the unloading port in good condition.

United Kingdom firms who may be interested in this enquiry should communicate with the company direct, sending full details of their commodity.

*

Boiled Sweets, Toffee, and Rock

Tasso Plantation Foods of 335, Mehle Avenue, New Orleans, Louisiana, have expressed interest in receiving quotations for hard confectionery packed in small cellulose bags. A sample of the type of bag required is available for inspection at the Board of Trade in Room 7148, Horse Guards Avenue, London, S.W.1. The U.S. firm stress that the cardboard labels with which the bags are sealed should be attractive, and packages must eventually bear the name of the enquiring firm. Tasso Plantation Foods are particularly interested in "seaside rock" with a place name running through it. It is essential that confectionery offered should be well packed for export and must be capable of withstanding a semi-tropical climate without special storage.

Interested United Kingdom manufacturers should communicate direct, by air mail, with Mr. B. Bell of the New Orleans firm sending:

(*a*) Quotations in dollars c.i.f. New Orleans.

(*b*) Indications of delivery dates.

(*c*) Samples, which are regarded by the U.S. firm as essential.

All foodstuffs destined for the United States are subject to the United States Food and Drugs Administration Regulations.

Norway Helps India's Fisheries

The people of Norway, whose government has already guaranteed 10 million kroner for technical assistance to India, are soon to be asked to contribute an equal sum in a nation-wide public subscription campaign launched by the Norwegian Foundation for Assistance to Underdeveloped Countries. This organisation was created by the Norwegian Parliament last year to co-operate with the United Nations in providing technical aid in the realms of fisheries, forestry, and electric power development.

Initially the aid given will concentrate on building up fisheries in the Indian province of Travancore, and on related projects designed to improve the living conditions of the fishermen and their families.

The chief of the Norwegian Mission, Dr. Diderich Lund, has already left for India, where he will establish headquarters near the two small fishing villages of Sakthigulangara and Puthanturay, about eight miles north of the town of Quilon. He will be joined in the near future by five other Norwegian experts—an engineer, a doctor, a nurse, a specialist on social welfare, and an administrative secretary.

One of the first actions to be taken is an attempt to modernise the traditional boats used by the Travancore fishermen. These craft, which are designed for sailing or propulsion by hand, are simply constructed of wood, bound with thongs which tighten when wet.

Two typical boats have already been brought to Oslo, where marine specialists will conduct a series of experiments to determine how their design and construction can be modified to make possible the installation of small engines, thus greatly extending their range and enabling the fishermen to reach more distant waters. Once a suitable type of engine has been developed, it is estimated that at least 12,000 craft will have power units installed.

In addition to the work being done on the fishing boats, a number of plans proposed by the Norwegians are now being reviewed by the Indian Government, with whom the final decision as to the type of technical assistance rests. These include the construction of a pipeline which will bring water to the fishing villages from a nearby lake, the establishment of a small model hospital, the erection of an ice factory on the coast, the setting up of a series of cold storage depots, and the supply of refrigerator trucks to transport the catch. It is also anticipated that some educational projects will be carried out in the area.

Greece to Produce More Cheese

The Greek Agricultural Bank is planning to set up at least two cheese making plants in central and northern Greece this autumn. The plants will comprise milk drying and condensing sections.

The Bank expects the scheme to result in important foreign currency savings as Greek expenditure on foreign dried milk, cheese, and condensed milk amounts to around 30 million dollars per year.

Unleavened Bread

Since time immemorial the natives of East Africa have fortified themselves on long journeys with *burgutta*, an unleavened bread that can be rapidly baked where water is available. The sole ingredients are the flour of *sorghum cernuum* (resembling Italian maize flour), salt, and water, the flour being stone-ground beforehand. A fire is kindled, and the required amounts of flour, salt, and water are made into a paste which is shaped into a ball. At this stage a rounded stone is placed in the fire and while this is heating, the native presses the paste into the shape of a bowl with his fist. With the aid of a branch the now red-hot stone is now placed in the "bowl" which is then reshaped into a ball with both hands. The stone helps to bake the interior while the mass is rotated over the flame.

The *burgutta* is ready for eating within 20 minutes after the start of operations. It breaks conveniently into two halves, one of which can be retained for consumption next morning. The bread is reported to be quite palatable and digestible. Attempts have been made to induce the natives to go in for a more modern bread on the basis of leavened wheat flour but the traditional *burgutta* is preferred.

News from the Ministries

Small Cans of Evaporated Milk

For the first time since 1940, unsweetened condensed milk (evaporated milk) is available in small cans. Each can will contain 6 oz. evaporated milk (equivalent to three-quarters of a pint of liquid milk) and the maximum retail price will be 8d. a can.

Production of these small cans was stopped early in the war because of the shortage of tinplate.

The necessary further amendment to the Condensed Milk Order, 1951 (S.I., 1953, No. 949), has been made.

Cleaning Dairy Equipment

Approval has been given by the Minister of Agriculture and Fisheries and the Minister of Food to an amplification of the name of the sodium hypochlorite solution Chloros already approved under Regulation 26 of the Milk and Dairies Regulations, 1949, as an oxidising or preservative agent for use in the cleansing of dairy equipment. The amended name of this approved product is Chloros (Agricultural Grade) and the manufacturers are Imperial Chemical Industries. The name "Chloros" has been withdrawn from the list of products approved under the Regulations.

Imported Tomatoes

All traders in tomatoes are again reminded of the provisions of the Merchandise Marks (Imported Goods) No. 4 Order, 1929. The Order requires all imported tomatoes to bear an indication of origin on importation and at subsequent stages, including exposure for sale by retail. The expression "indication of origin" means either the word "Empire" or the word "Foreign," as the case may be, or a definite indication of the actual country of origin.

When tomatoes are imported, the indication of origin must appear on each outer container, or on a label securely attached to the container, in letters not less than half-an-inch in height; when imported tomatoes are exposed for sale in a shop or on a barrow, a show ticket, bearing the indication of origin in letters not less than half-an-inch in height, must be displayed, so that it is clearly visible to intending purchasers.

The country of origin of tomatoes from the Channel Islands must be indicated either by the word "Empire" or by some definite indication such as "Jersey Produce."

Failure to comply with the provisions of the Order is an offence against the Merchandise Marks Acts for which penalties are provided.

Hedging Facilities for Grain

In order to facilitate the resumption of private imports of cereals, arrangements are being made whereby traders and manufacturers will be assisted to cover themselves against the risks of price fluctuation by hedging their operations. Details of the foreign exchange arrangements relating to these operations are at present being discussed by the Bank of England with the trades concerned.

Oils and Fats

A further quantity of fat which has not been taken up from allocations to trade users is to be re-allocated in the current period to those industries with special claims who can use the types available. The total quantity of fat for re-allocation is about 4,700 tons, mainly in the form of palm kernel oil and dripping. The main industries which will benefit are chocolate and sugar confectionery, biscuits, and flour confectionery.

Australian Butter and Cheese

An agreement has been concluded between the Ministry of Food and the Australian Government on prices to be paid for butter and cheese in the 12 months ending June 30, 1954.

The United Kingdom will pay 326s. (sterling) per cwt., f.o.b., for choicest grade butter, instead of 314s. as at present, and 182s. 6d. per cwt., f.o.b., for choicest and first grade cheese, compared with the current price of 176s.

Under the agreement Australia will send 100 per cent. of her exportable surplus of butter and cheese, less 13,500 tons of commercial butter equivalent.

Glucose for Food Manufacturers

Following a further review of prospective supplies of glucose and the requirements of food industries, the Minister of Food has decided to continue for a further period, from July 12 to September 5, the increased allocations of glucose which applied for the period January 25 to May 16, 1953, and which were repeated for the period May 17 to July 11. The special additional allocation of 4,500 tons of glucose for chocolate and sugar confectionery in the period May 17 to July 11 will not be repeated for the period to September 5.

The industries concerned are, in addition to chocolate and sugar confectionery, biscuits, flour confectionery, bakers' sundries, preserves, table jellies, medicinal beverages, pickles and sauces, candied peel and glacé cherries, and soluble coffee powder.

Imports of Egg Products

The import of certain egg products, such as dried and frozen hen egg (but not frozen whole egg) and glycerinated yolk, has now been returned to private traders. These goods will be allowed in from sterling area countries and Muscat and Oman without restrictions under Open General Licence and from certain non-dollar and non-sterling countries under Open Individual Licence.

Importation of Raw Cherries

To prevent the introduction of cherry fruit fly into England and Wales, the Minister of Agriculture and Fisheries has made an Order entitled the Importation of Raw Cherries Order, 1953, imposing restrictions on the importation of cherries from Europe during the period May 19, 1953, to September 30, 1953.

Cherries grown in Austria, Bulgaria, Czechoslovakia, France, Germany, Hungary, Italy, Portugal, Spain, Switzerland, and Yugoslavia may be landed during the periods specified in the Order subject to certification as prescribed in the Schedule to the Order. Cherries from other European countries may be landed after May 18, 1953, provided they are accompanied by certificates of origin.

The provisions of the Order, which are the same as those imposed on such imports in 1952, do not abrogate any regulations made by the Board of Trade or the Ministry of Food.

Specially Designated Milk

The areas of Scotland in which all milk sold by retail must be "specially designated" milk (that is "certified," "pasteurised," "sterilised," or "tuberculin tested" milk or, until September 30, 1954, "standard" milk) are to be extended.

The Minister of Food, Major the Rt. Hon. Gwilym Lloyd-George, M.P., after consultation with the Secretary of State for Scotland, has declared his intention, subject to any representations that may be made, of laying before Parliament Draft Orders which will provide for the specification of further areas of Scotland as specified areas in which, from an appointed day, milk of special designation only may be sold. The appointed day will not be earlier than January 1, 1954.

The areas concerned are:

The Large Burghs of Arbroath, Dumfries, Falkirk, Inverness, Kilmarnock, Perth, and Stirling.

The Small Burghs of Carnoustie, Crieff, Grangemouth, and Johnstone.

Information and Advice

This Service is available to subscribers to FOOD MANUFACTURE. If a stamped addressed envelope is enclosed replies will be sent by post, but enquiries cannot be answered by telephone.

Meat Roll

B.6622. *Please give me details and formula for a good meat roll.* (Yorks.)

The following formula may be used as a basis for trial:

	lb.	oz.
Lean pork or chicken	6	–
Pork fat	2	8
Cooked tongue	2	–
Scalded rice flour	2	–
Dry rusk	1	–
Milk	1	6
Seasoning		
Ground white pepper		1
Ground mace		½
Ground parsley		½
Ground thyme		½

The lean and the fat meat is cubed and packed down for 36 hours with the following cure:

	oz.
Salt	4½
Saltpetre	½
Sugar	½

The cured lean meat is passed through the fine plate of the mincer and the fat through the coarse plate. The seasoning, rice, and rusk (dry) are added to the lean meat in the bowl chopper, the fat being put in last of all. The whole is chopped to a smooth paste and filled into a suitable container which has previously been slightly greased. Air locks should be avoided. The roll is cooked at a temperature of 180°F. for about two hours.

Extraction of Pectin from Fruit Residues

B.6623. *We should like to receive some details of the methods of extracting pectin from apple pomace.* (France)

The Western Regional Research Laboratory of Albany, California, have published details of a method for extraction of pectin from apple pomace.

The cold water soluble substances (especially sugars and heavy metals) are removed by treatment of one part of pomace with 10 parts of water at 50°C. for half an hour with continuous stirring, the process being repeated at least once.

The drained leached pomace is mixed with water to the extent of 10 times the weight of the dry pomace and the liquor brought to *p*H 2·8 with sulphuric acid. The mixture is boiled for one hour by steam. The pressing of the pulp is facilitated by the addition of 0·5 per cent. by weight of paper pulp and filter aid.

The extract is cooled to 50°C., the *p*H adjusted to 4·5 with sodium carbonate, and starch-decomposing enzymes added at the rate of 0·1 to 0·2 per cent. by weight of dry extract for one to two hours. Citric acid is then added at 0·3 per cent. concentration by weight until the *p*H falls to 3·0.

The temperature of the liquor is again raised, this time to 80°C., and before filtration sulphur dioxide is added just to saturation. The liquor thus prepared and clarified is concentrated *in vacuo* to one quarter of its initial volume.

At this stage, the product is usually a 5-grade pectin extract, the modern definition of pectin grade being the number of units of sugar that can be made into a jelly of standard firmness by the pectin in one unit of extract under standard acid conditions. The extract is flash pasteurised at 85°C. and packed hot into suitable containers.

Apricot Purée in Cake Making

B.6624. *Can you give me details of the preparation of apricot jelly for flavouring cakes and also for coating small fancies and gateaux?* (Yorks.)

If a 10 lb. tin of apricot pulp is used, this should first be rubbed through a fine sieve to remove all the stringy matter. The sieved pulp is then boiled in a copper pan with 10 lb. of sugar for 15 minutes. The sugar must all be dissolved before allowing the mixture to boil and the sides of the pan should be washed down occasionally to prevent the formation of sugar crystals. The mixture should be stirred only occasionally during the boiling operation. Any scum that rises to the surface is removed and when ready the jelly is run into suitable sterile jars and covered until required for use.

When using apricot purée, a little of the jelly is placed in a copper pan and heated to the thread degree. To test for this, a little is taken between thumb and forefinger, and if it threads easily it is ready. The purée should not be beaten or worked overmuch during this second boiling, otherwise it will become cloudy and useless for covering meringue goods or for decorative purposes. Care should be taken when testing to get the correct consistency, because if too thin, it will tend to soak into the goods instead of setting as a jelly on the top and if overboiled, it will be tough and leathery and become discoloured.

The purée may be coloured as required for decorating or covering meringue fancies, or used as a jelly after flavouring with fruit flavours.

Information Supplied

The Enquiry Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery, and materials, and also general information as follows:

B.6569. *Yoghourt and dried milk.* (Hants.)
B.6571. *Cat food.* (Ireland)
B.6572. *Centrifugal separator.* (Kent)
B.6573. *Electrically operated can openers.* (London)
B.6575. *Cheese straws.* (London)
B.6576. *Control equipment.* (Brazil)
B.6579. *Gluten.* (Lancs.)
B.6581. *Bacteriology of canned foods.* (Kenya Colony)
B.6582. *Cake mixture.* (Northants.)
B.6584. *Lemon curd.* (Wilts.)
B.6585. *Synthetic cream powder.* (*N. Ireland*)
B.6586. *Bag closing equipment for packing vacuum salt.* (India)
B.6587. *Chocolates and fruit syrups.* (Dorset)
B.6589. *Egg cracking and separating.* (Glos.)
B.6590. *Sherbet.* (Ireland)
B.6591. *Boiled sweets.* (London)
B.6592. *Vacuum packing for food.* (Switzerland)

Information Required

B.6610. *Suppliers of decorative rubber parsley or other imitation parsley for use in cooked meat product shops.* (Yorks.)

Recent Patents

692,167. WINGFOOT CORPORATION: Film for packaging meats and other foodstuffs.
693,698. PIPER AND SONS, LTD., F.: Sifting machine, particularly for sifting flour.
693,716. HOLLIS, A. C.: Packaging machinery.
693,722. KUCKLINSKY, F. W.: Coating apparatus for wrapping and cartoning machines.
693,748. ICE WATER DISPENSERS, LTD., and REFRIGERATION (BLETCHLEY), LTD.: Method and apparatus for delivering chilled liquids.
693,768. NEDERLANDSE ORGANISATIE VOOR TOEGEPAST — NATUURWETENSCHAP — PELIJK ONDERZOEK TEN BEHOEVE VAN DE VOEDING: Prevention of flavour reversion in edible fats, fatty oils, and in foodstuffs containing such fats and fatty oils.
693,778. AUTOPACK, LTD., SMITH, A. R., LEE, G. A., and HOPKINS, C. J.: Automatic weighing machines.
693,820. BROOKS, E., and BROOKS, E.: Apparatus for use in the manufacture of frozen sweetmeats.
693,827. BRIDGES AND CO., LTD., S. N.: Homogenising apparatus.
693,831. VICARS, LTD., T. AND T.: Manufacture of biscuits and like confectionery products.
693,833. RHODESIAN JUTE INDUSTRIES, LTD., THOMPSON, H. D., and WIGHTWICK, H. D.: Means for the decortication of fibrous vegetable stems.
693,878. GAMBLE, H., and SCHWARZ, L.: Infra-red radiation electrically heated baking devices, particularly for biscuits and cookies.
693,891. NATIONAL PRESSURE COOKER CO.: Pressure cookers.
693,972. DICKINSON AND CO., LTD., J.: Bags, envelopes, and like containers and the attachment thereof to supporting and display means in a readily detachable manner.
693,981. LEVER BROS. AND UNILEVER, LTD.: Process for isomerising unsaturated fatty acids or esters thereof.

ABSTRACTS OF BRITISH PATENTS

The Coating of Metal Surfaces

A method of coating metal surfaces, particularly applicable to the coating of the interior surfaces of food containers, although it is not limited thereto, is described.

It consists of electro-depositing on the metal surface as anode a naturally occurring hydrophilic colloid of animal or vegetable origin, from an alkaline solution containing sodium aluminate whereby an aluminous compound is codeposited with the hydrophilic colloid to form a binding agent therefor.

The hydrophilic colloid may be a carbohydrate, protein, or albumin, and examples of suitable substances are starch, egg albumin, pectin, gum arabic, gum acacia, gum tragacanth, gum ghatto, and gelatin.

The presence of sodium aluminate with or without sodium silicate causes a co-deposition of alumina or aluminium hydroxide or of silica or hydrated silica and it is thought that this acts as a binding agent or as an anchoring medium by which the deposited colloid is caused to adhere tenaciously to the metal surface.

518,554. *Robert Barlow and William Clayton.*

Flavour of Dehydrated Whale Meat

To avoid the liver oil taste in dehydrated whale meat, it has been proposed to free the product from its fat content by extraction with fat solvents. Dehydrated meat treated in this way will not become rancid or acquire an unpleasant liver oil taste or odour, even after years of storage at ordinary temperature.

It has been found, however, that even when dried whale meat is treated with fat solvents another secondary taste is apt to arise—the so-called "fish taste"—which cannot be ascribed to the content of marine oils, as this taste also appears after the oil has been quantitatively removed.

If, however, flavour improving substances are added to the raw, minced meat instead of the dried product, so that the substances remain in contact with the meat during the whole drying process, they will penetrate into the meat material and wholly prevent the undesirable fish taste from emerging.

691,271. *Reider Gording.*

Edible Plastic Substances

The invention relates to the manufacture of edible plastic substances, the word "plastic" meaning a material which has physical characteristics substantially equivalent to those possessed at ordinary atmospheric temperatures by such edible materials as butter, oleomargarine, lard, or by substitutes for such materials. It is of particular value in connexion with the manufacture of butter or butter substitutes.

A method is described of manufacturing an oleaginous edible plastic substance which comprises preparing a material containing about 80 per cent. of an edible fat which is normally non-liquid at normal atmospheric temperatures but which can be liquefied at temperatures considerably below 212°F. The material is heated so as to liquefy the fat and thereby render it capable of flowing, then mixed with a vaporisable liquid, which can be evaporated at a pressure lower than that at which the liquid and heated material are mixed at a temperature below the point of solidification of the edible fat. The mixture is then sprayed into a chamber which is maintained at a pressure below that at which the vaporisable liquid evaporates, thereby contemporaneously reducing the temperature of the material to a point considerably below its liquefying temperature so as to convert the material into a finely divided solid. The solid particles are then mechanically worked to form a coherent plastic mass.

690,663. *Kraft Food Company.*

Recovery of Carotene

A process is described for recovering carotene from carotene-containing oils and derivatives thereof which comprises contacting the oil or derivatives with finely divided activated carbon which has been freed of oxygen and removing the carotene adsorbed in the carbon by any carotene solvent having an eluting action in respect of carotene so adsorbed.

The activated carbon may be freed of oxygen by treating it at normal or at a slightly elevated temperature with a reducing agent, such as hydroquinone, formic acid, or sodium sulphite dissolved in a suitable liquid such as benzene, ether, alcohol, or water. Preferably a solution of hydroquinone in benzene is used. When treating activated carbon with such a solution, the treatment is continued until hydroquinone is detected in the filtrate. Benzene is then used for rinsing the carbon until all the quinone and hydroquinone have been expelled from the carbon. This benzene has then to be expelled from the carbon with petroleum ether or some other fat solvent, such as ether or acetone, since benzene has an eluting action in respect of carotene.

The activated carbon may also be freed of oxygen by treating it with a gas such as hydrogen, carbon monoxide, nitrogen, steam, or carbon dioxide at a temperature above 350°C. Preferably temperatures between 400°C. and 500°C. should be used. Any increase of temperature above 500°C., however, does not give a better effect.

Such treatment of the carbon results in an activated carbon having a good adsorptive capacity towards carotene dissolved in oil or derivatives thereof.

691,924. *Lever Brothers and Unilever Ltd.*

ABSTRACTS OF GERMAN PATENTS

Opening Device for Containers

An opening device for a storage container in which there is an opening in the cover, wherein a screw-bolt is disposed and is provided with packing, is described. The screw-bolt has a central passage right through it which is closable by a screw-cap with a packing disc.

836,732. *Michael Kirschensteiner.*

Food Drying Method

A process for the drying of food, made of potatoes, or similar earth products, of vegetables or fruit, is given wherein the raw cleansed but whole output material employed, including shell, kernel, husk, seeds, is finely triturated and the thin fluid pulp coming from the juice is dried at a low temperature (under 100°) in an atmosphere as far as possible free from oxygen, preferably containing carbon dioxide, or other inert gas.

836,734. *Richard von der Heide.*

Apparatus for Sorting Apples

In this patent is described a method for sorting fruit, especially apples, wherein at least two rings of different diameters with centres offset from each other are rotatably disposed in the same horizontal plane, and on rotation about the vertical central axis form a sorting channel between them, namely between their edges which are continuously changing their distance apart, by which the fruits are distributed on falling through, according to their size classification.

838,083. *Bernard Dammann.*

British patents and trade marks have been selected from the "Official Journal of Patents" and the "Official Trade Marks Journal" and are published by permission of the Controller of H.M.S.O.

Trade Marks

QUICKFIT.—689,617. Scientific glassware, and apparatus for use therewith. **Quickfit and Quartz, Limited,** 1, Albemarle Street, London, W.1; Manufacturers.

DEXTROSOL. — 703,903. Preparations consisting of or containing dextrose, all for use as food or as ingredients in food. **Corn Products Refining Company** (a Corporation organised and existing under the laws of the State of New Jersey, United States of America), 17, Battery Place, City of New York, State of New York, United States of America; Manufacturers.

PECTA-PUREE.—705,588. Apple pomace purée for use in the preparation of fruit sauces. **William Evans and Company (Hereford and Devon), Limited,** Widemarsh, Hereford; Manufacturers.

ARISTOCRAT.—706,298. Ice cream, water ices, and frozen iced confections, none consisting of or containing chocolate; and preparations for making all the aforesaid goods. **Eldorado Ice Cream Company, Limited,** 14, West Smithfield, London, E.C.1; Manufacturers.

DULCIES. — 708,738. Non - medicated confectionery. **London and Continental Export Company, Limited,** trading also as **Dulcet Confectionery,** 29, Mincing Lane, London, E.C.3; Manufacturers.

SWIFT'S.—710,163. Processed cheese and dressed poultry. **Swift and Company, Limited,** 58, West Smithfield, London, E.C.1; Manufacturers and Merchants.

BUTTERKIST.—711,784. Non-medicated confectionery containing butter. **Clarks Cereal Products, Limited,** Blackborne Road, Dagenham, Essex; Manufacturers and Merchants.

PAYDAY. — 712,036. Biscuits (other than biscuits for animals). **Excelsior Biscuit Company, Limited,** 50, Thomas Road, London, E.14; Manufacturers and Merchants.

GLUCAPOPS.—712,105. Iced lollipops containing glucose. **Ernest Donald Howard,** 6, Caswell Bay Road, Bishopston, Swansea; Manufacturer and Merchant.

MEDDOFRUTE. — 712,424. Non - medicated confectionery containing fruit essences. **Meddocream, Limited,** Old Bromford Lane, Ward End, Birmingham, 8; Manufacturers and Merchants.

PUNCH. — 712,462. Wafer biscuits; and containers made of wafer biscuit for ice cream and similar confections. **Askeys Premier Biscuit Company, Limited,** 290, Kensal Road, London, W.10; Manufacturers.

EL JABALI.—713,580. Canned fruit, canned vegetables, and tomato purée. **Francisco Gonzalez Martinez,** Princesa 21, Murcia, Spain; Canner and Merchant.

CURLIES.—714,482. Potato crisps. **Potacurls (London), Limited,** 104, Tooley Street, London, S.E.1; Manufacturers and Merchants.

TOMMY CAN.—714,615. Common metal containers for use in storing and transporting liquids. **Ewart and Son, Limited,** Works Road, Letchworth, Hertfordshire; Merchants and Manufacturers.

OMNIA-VAC.—714,872. Metal caps or closures for bottles and similar containers. **Thomas Hunter, Limited,** Omnia Works, Rugby, Warwickshire; Manufacturers and Merchants.

STARBAR.—715,079. Biscuits (other than biscuits for animals). **Symbol Biscuits, Limited,** Sunya House, Scrubs Lane, Willesden, London, N.W.10; Merchants and Manufacturers.

MICRONATOR.—715,122. Grinding mills. **The Pascall Engineering Company, Limited,** 114, Lisson Grove, London, N.W.1; Manufacturers.

BO BO.—715,180. Chewing gum. **William Gershon Rose** and **Dennis Carlyle Rose,** trading as **Chix Chewing Gum,** 29-31, Kensal Road, Paddington, London, W.10; Manufacturers and Merchants.

SEACREST.—715,232. Fish (other than live fish). **Joe Little, Limited,** 47, Sinclair Road, Aberdeen, and Fish Docks, Great Grimsby; Wholesale Fish Merchants.

OSCABAR.—715,377. Biscuits (other than biscuits for animals). **Symbol Biscuits, Limited,** Sunya House, Scrubs Lane, Willesden, London, N.W.10; Merchants and Manufacturers.

VALDAMILD.—715,420. Non-medicated pastilles and non-medicated confectionery. **Pastilval, Limited,** 74-77, White Lion Street, London, N.1; Chemists.

COROLUX.—715,493. Bread, flour, and cereal preparations for food for human consumption. **Harrington and Forcey, Limited,** 252, Portland Road, Hove 3, Sussex; Manufacturers and Merchants.

LILLIPUT.—715,586. Non - medicated confectionery. **Henry W. Peabody and Company of London, Limited,** 16, Eastcheap, London, E.C.3; Merchants.

CELEVISION.—715,623. Bags and wrappers made from transparent films (plastics). **Donaldson and Filer, Limited,** Effendi Works, 31, Cogan Street, Pollokshaws, Glasgow, S.3; Manufacturers.

HILANDALE.—715,994. Cheese spreads, and food products consisting principally of cheese. **Miller, Ball and Toulmin, Limited,** 81, Fishergate, Preston, Lancashire; Manufacturers and Merchants.

NUCLEAR.—715,976. Flour. **Charles Arthur Botting, Maurice Valentine Botting, Guy Oliver Botting,** and **John Maurice Botting,** trading as **C. A. Botting and Son,** Albury Mill, Albury, nr. Guildford, Surrey; Millers.

OSBO.—716,123. Tea. **Osborne, Flinn and Company, Limited,** 10a, Lant Street, London, S.E.1; Merchants.

TEAL.—716,181. Margarine and cooking fats. **Merseyside Food Products, Limited,** Brookhill Works, Marsh Lane, Bootle, Liverpool, Lancashire; Manufacturers.

DURELECT.—716,210. Bakers' ovens. **Tom Chandley, Limited,** 205, Wilmslow Road, Rusholme, Manchester, 4; Manufacturers and Merchants.

New Companies

C. Hyde and Son, Limited. (519054.) 76, Marsh Road, Luton, Beds. To carry on business of bakers and confectioners, biscuit manufacturers, etc. Nom. cap.: £8,000 in £1 shares. Dirs.: C. Hyde, 7, Marsh Road, Luton, Beds. (permt.) and E. W. Hyde, 55, St. Mildreds Avenue, Luton, Beds.

Dawn Crisps (Newport), Limited. (519161.) Broadway Street, Burton-on-Trent. To carry on business of potato crisp manufacturers and dealers, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: H. G. Burrows, 63, Honhurst Hill, Burton-on-Trent (permt.) and R. A. Urrutia, 5, Carlisle Street, Newport.

Sayn Engineering, Limited. (519333.) 7, Stone Buildings, Lincolns Inn, London, W.C.2. To carry on business of processors of fruit and other foods, etc. Nom. cap.: £1,000 in £1 shares. Dir.: K. Liebenthal, Headstone, Harrow, Middlesex. Subs.: K. Liebenthal (Acct.) and Mrs. A. Liebenthal, 76, Courtenay Avenue, Headstone, Harrow, Middlesex.

Alpine Food Products, Limited. (519420.) Stephenson Street, Thornaby-on-Tees, Yorks. Nom. cap.: £100 in £1 shares. Dirs.: T. D. R. Bensted, Strathmore, Yarm Road, Eaglescliffe; F. Robinson, 4, Cranford Gardens, Acklam, Middlesbrough; and Mrs. H. Pumphrey, The Woodlands, Newby-in-Cleveland, Middlesbrough.

B. and M. Fall, Limited. (519497.) To carry on business of brokers, commission agents, dealers in and general agents for the sale and purchase of rubber, oil seeds, edible oils, cattle food and feeding-stuffs, general produce, and consumable goods. Nom. cap.: £6,500 in £1 shares. Dirs.: to be appointed by subs. Subs.: J. W. Fall and Mrs. E. J. P. Fall, 1, The Chestnuts, Walton - on - Thames, Surrey.

Nicholas Wells, Limited. (519541.) Gower Street, Birmingham, 19. To carry on business of manufacturers of and dealers in confections, chocolates, boiled sweets, ice cream, coffee, tea, etc. Nom. cap.: £10,000 in £1 shares. Dirs.: K. H. Nicholas, 18, Somerville Road, Sutton Coldfield, Warwicks.; R. M. Williams, 69, Foley Road, Streetly, Warwicks.; L. N. Morrison-Wells; Mrs. V. E. Morrison-Wells; R. Hewitson; and H. B. T. Wilde.

Polenghi Lombardo (England), Limited. (519559.) 30, Bridle Lane, London, W.1. To carry on business of manufacturers and general merchants, brokers, agents, importers and exporters of goods of all kinds, in particular dairy produce, salami, meat, meat products, etc. Nom. cap.: £1,000 in £1 shares. Dir.: V. Bertoluzzi, 30, Greville Road, N.W.6.

Anglo - Spanish Canners, Limited. (519743.) Peninsular House, 28, Monument Street, London, E.C.2. To carry on business of canners and packers of and dealers in fruit, vegetables, meat, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: A. Gonzales, 35, Sandringham Court, Maida Vale, W.9; G. O. Hearne, 12, Lovelace Gardens, Surbiton, Surrey; and B. Z. Gittelson, 30, The Grove, Edgware, Middlesex.

Hely and Son, Limited. (519810.) 62, Hatcham Road, Ilderton Road, London, S.E.15. To carry on business of manufacturers of sugar confectionery, medicated confectionery, chocolate, lemonade powder, etc. Nom. cap.: £10,000 in £1 shares. Dirs.: W. J. Hely, 17, Oakdale, Chase Side, Southgate, London, N.14; and A. E. Hely, Ashridge, Corkscrew Hill, West Wickham.

United Confectionery Company, Limited. (519821.) 164, High Street, Southend-on-Sea. To carry on business of manufacturers of and dealers in confectionery and chocolate, ice cream, and similar sweetmeats. Nom. cap.: £2,500 in £1 shares. Dirs.: Lily Goodwin, 1, Chester Avenue, Thorpe Bay, and W. Goodwin, 88, Dalmatia Road, Southend-on-Sea.

Gayfriars Confectionery Company, Limited. (520005.) Greyfriars House, Hawk Lane, Battlesbridge, Essex. To carry on business of bakers, manufacturers of and dealers in bread, flour, biscuits, etc. Nom. cap.: £1,000 in £1 shares. Permt. dirs.: Freda Schallamach, 69, Seddon Road, Morden, Surrey, and E. Erdes, 11, Victoria Avenue, Morden, Surrey.

From Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C.2.